CHAPTER 4

POINT AND NONPOINT SOURCE CHARACTERIZATION OF THE TENNESSEE PORTION OF THE UPPER FRENCH BROAD RIVER WATERSHED

4.1. BACKGROUND. This chapter is organized by HUC-12 subwatershed, and the description of each subwatershed is divided into four parts:

i. General description of the subwatershed
ii. Location of USGS (United States Geological Survey) and STORET sites.
iii. Location of Permitted Activities
iv. Description of nonpoint source contributions

The HUC can range from 2 to 16 digits long, more digits indicating a smaller and smaller portion of the watershed is represented. The Tennessee Portion of the Upper French Broad River Watershed (HUC 06010105) has been delineated into five HUC-12 subwatersheds.

Information for this chapter was obtained from databases maintained by the Division of Water Pollution Control or provided in the WCS (Watershed Characterization System) data set. The WCS used was version 2.0 (developed by Tetra Tech, Inc for EPA Region 4) released in 2003.

WCS integrates with ArcView® v3.x and Spatial Analyst® v1.1 to analyze user-delineated (sub)watersheds based on hydrologically connected water bodies. Reports are generated by integrating WCS with Microsoft® Word. Land Use/Land Cover information from 2001 MRLC (Multi-Resolution Land Cover) data are calculated based on the proportion of county-based land use/land cover in user-delineated (sub)watersheds. Nonpoint source data in WCS are based on agricultural census data collected 1992–1998; nonpoint source data were reviewed by Tennessee NRCS staff.

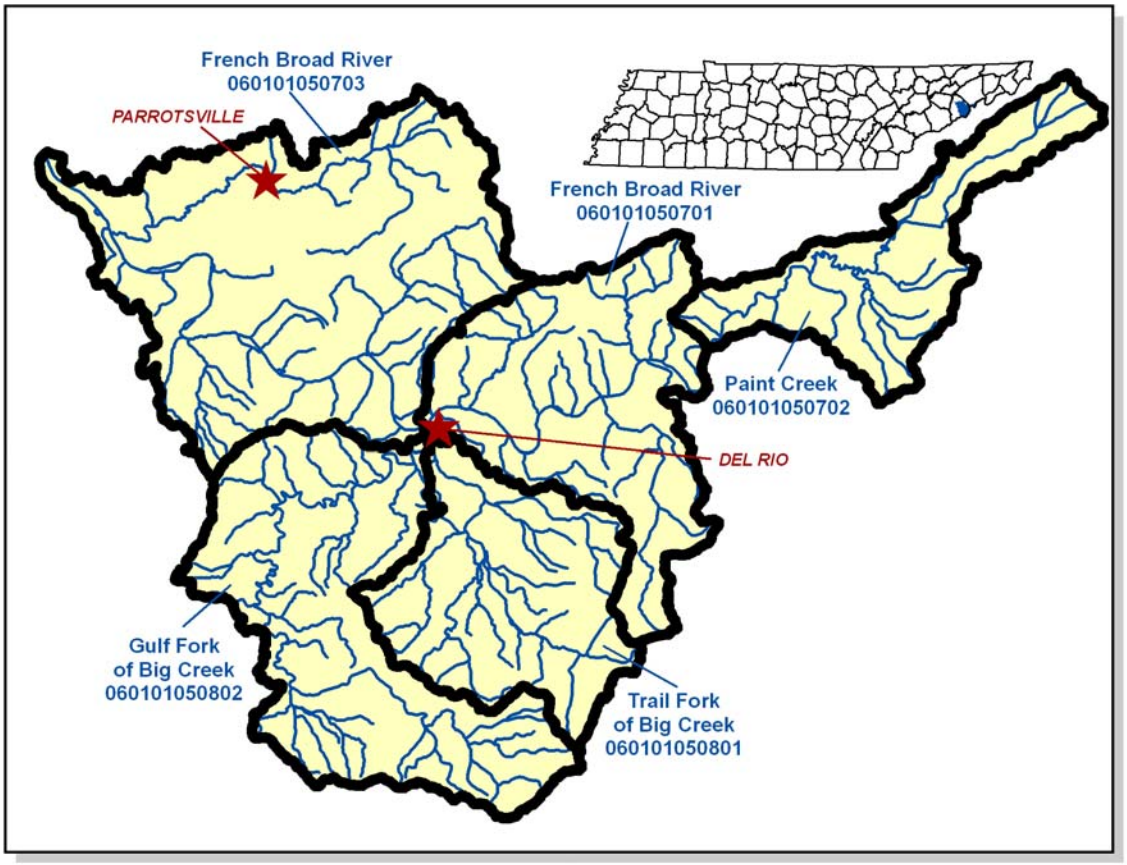

Figure 4-1. The Tennessee Portion of the Upper French Broad River Watershed is Composed of Five USGS-Delineated Subwatersheds (12-Digit Subwatersheds).

4.2. CHARACTERIZATION OF HUC-12 SUBWATERSHEDS. The Watershed Characterization System (WCS) software and data sets provided by EPA Region IV were used to characterize each subwatershed in the Tennessee portion of the Upper French Broad River Watershed.

HUC-8	HUC-10	HUC-12
06010105	0601010507	060101050701 (French Broad River)
		060101050702 (Paint Creek)
		060101050703 (French Broad River)
	0601001508	060101050801 (Trail Fork of Big Creek)
		060101050802 (Gulf Creek of Big Creek)

Table 4-1. HUC-12 Drainage Areas are Nested Within HUC-10 Drainages. *NRCS worked with USGS to delineate the HUC-10 and HUC-12 drainage boundaries.*

4.2.A. 060101050701 (French Broad River).

4.2.A.i. General Description.

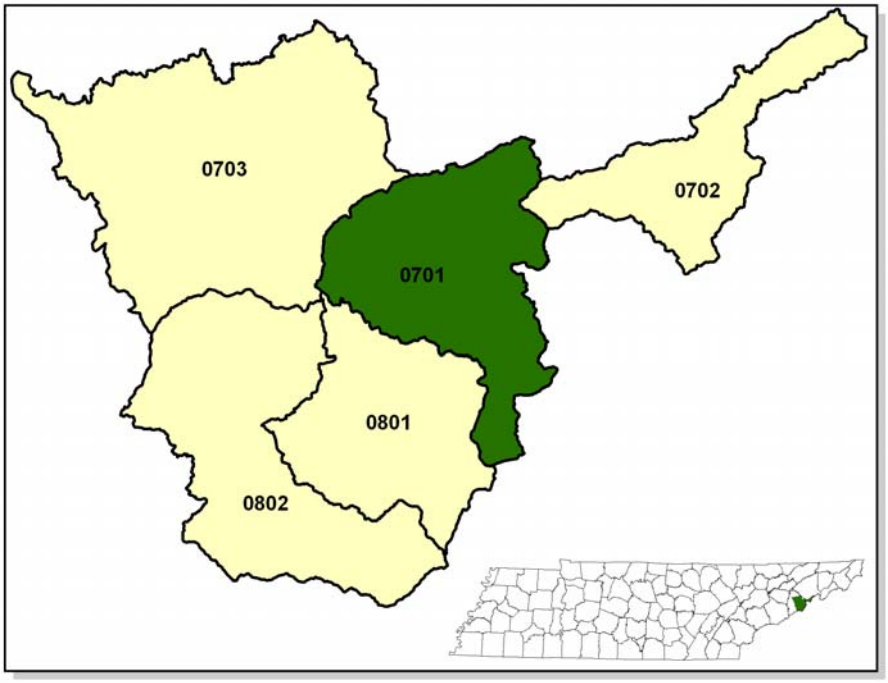

Figure 4-2. Location of Subwatershed 060101050701. *All Upper French Broad River HUC-12 subwatershed boundaries in Tennessee are shown for reference.*

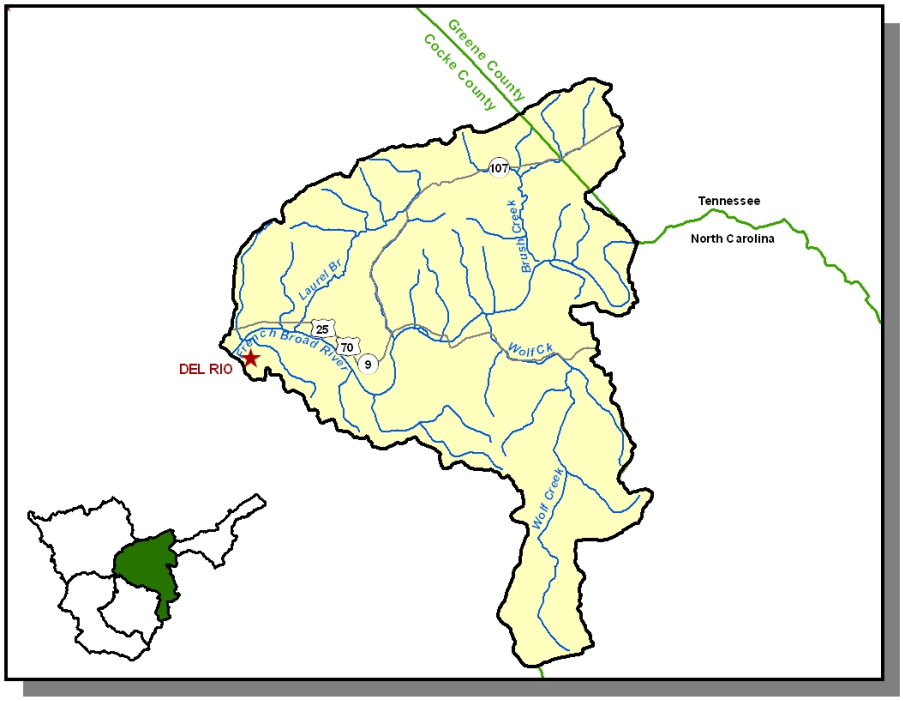

Figure 4-3. Locational Details of Subwatershed 060101050701.

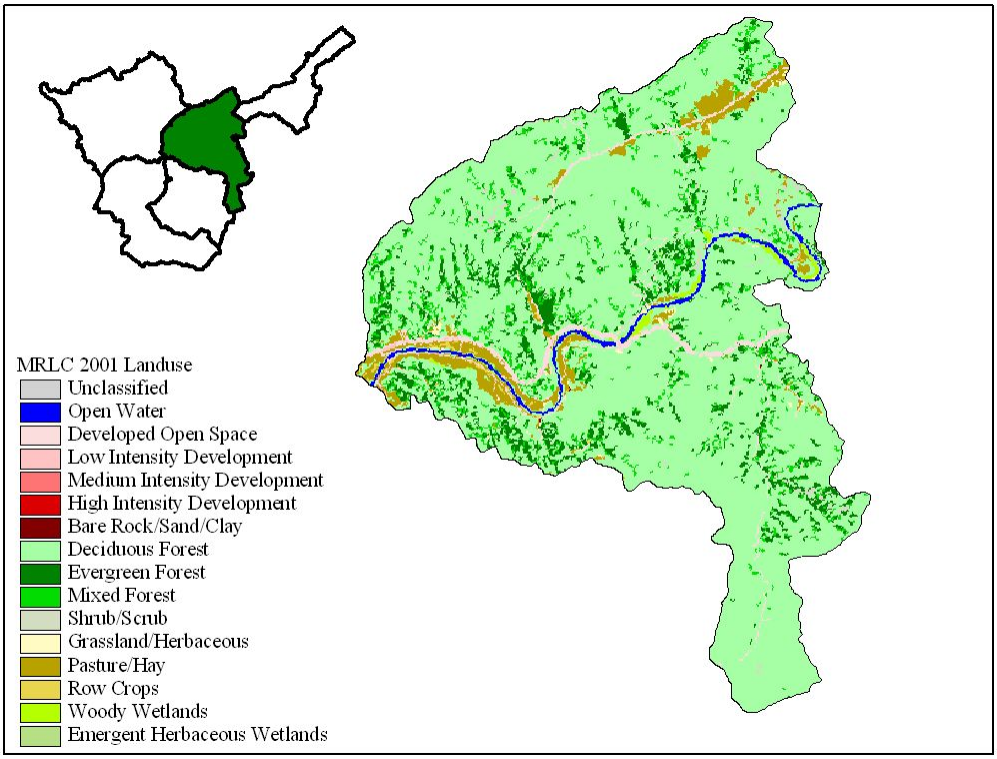

Figure 4-4. Illustration of Land Use Distribution in Subwatershed 060101050701.

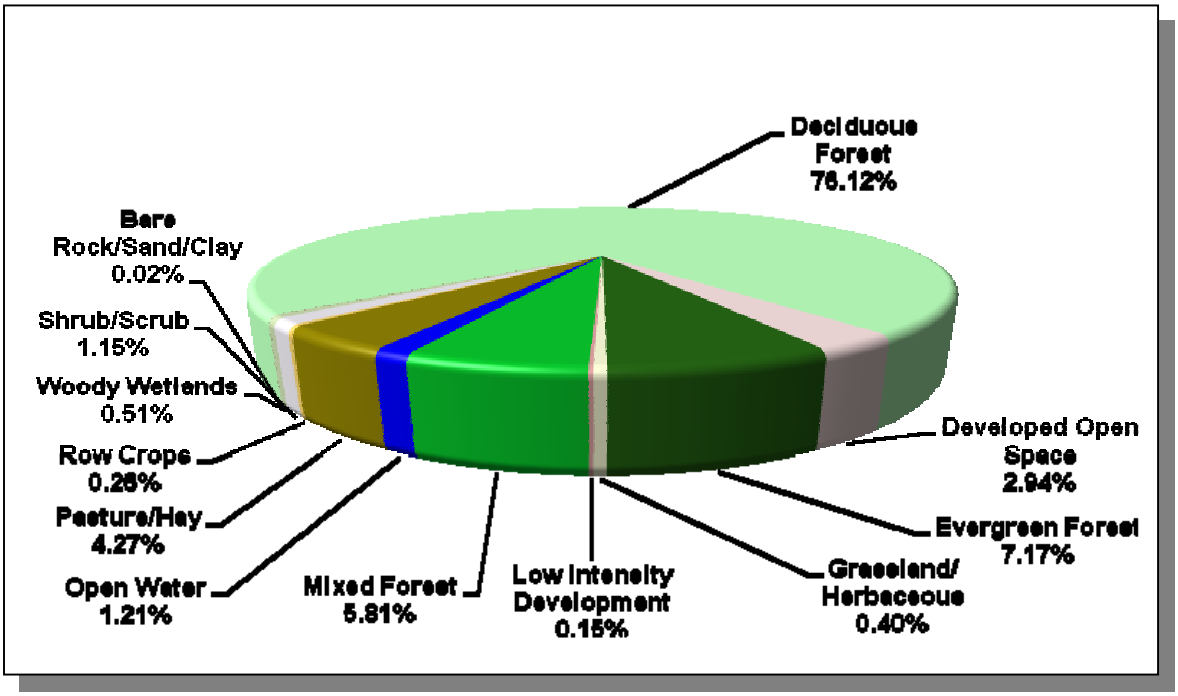

Figure 4-5. Land Use Distribution in Subwatershed 060101050701. *More information is provided in Appendix IV.*

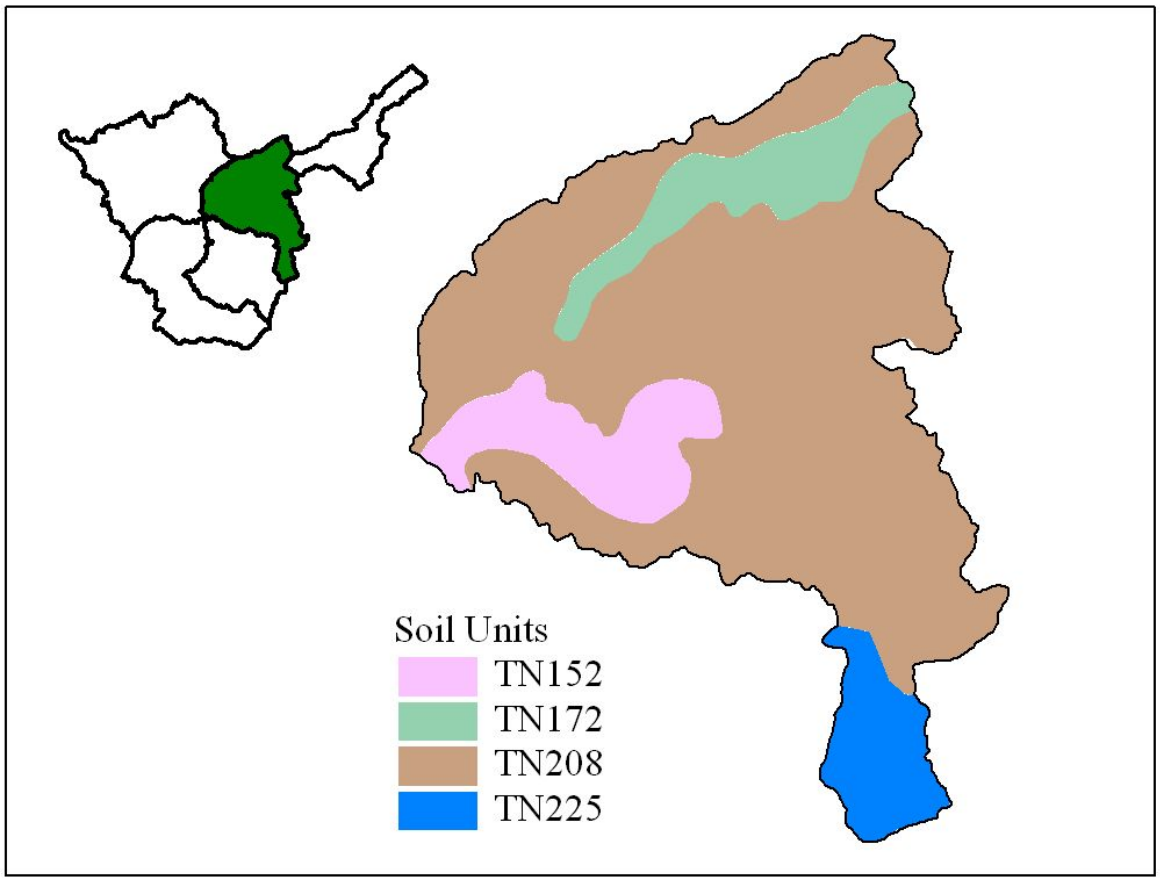

Figure 4-6. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 060101050701.

STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hour)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN152	0	B	2.11	5.26	Loam	0.31
TN172	0	B	3.87	5.13	Loam	0.26
TN208	0	C	4.02	4.84	Loam	0.25
TN225	0	B	3.90	5.03	Sandy Loam	0.22

Table 4-2. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 060101050701. *The definition of "Hydrologic Group" is provided in Appendix IV.*

	COUNTY POPULATION				ESTIMATED POPULATION IN WATERSHED			
County	1990	1997	2000	% of County in Watershed	1990	1997	2000	% Change (1990-2000)
Cocke	29,141	31,657	33,565	8.3	2,419	2,628	2,786	15.2
Greene	55,853	59,369	62,909	0.2	110	117	124	12.7

Table 4-3. Population Estimates in Subwatershed 060101050701.

4.2.A.ii. USGS Gaging Stations and STORET Sites.

There are no USGS continuous record gaging stations located in subwatershed 060101050701.

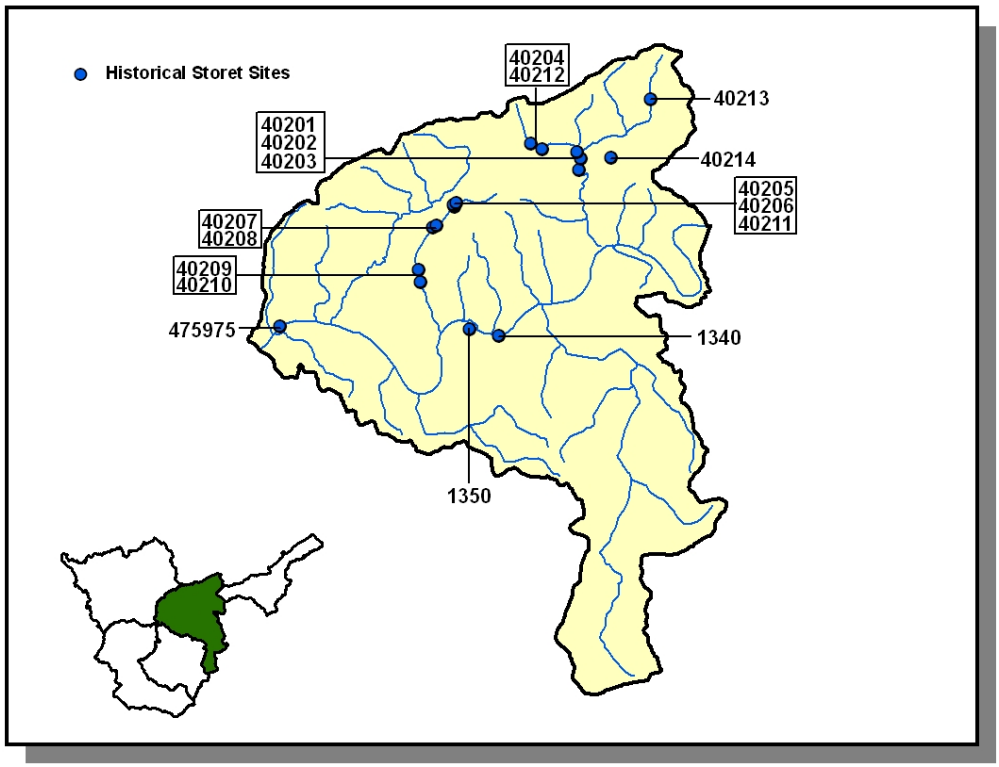

Figure 4-7. Location of Monitoring Sites in EPA's STORET Database in Subwatershed 060101050701. *More information, including site names and locations, is provided in Appendix IV.*

4.2.A.iii. Permitted Activities.

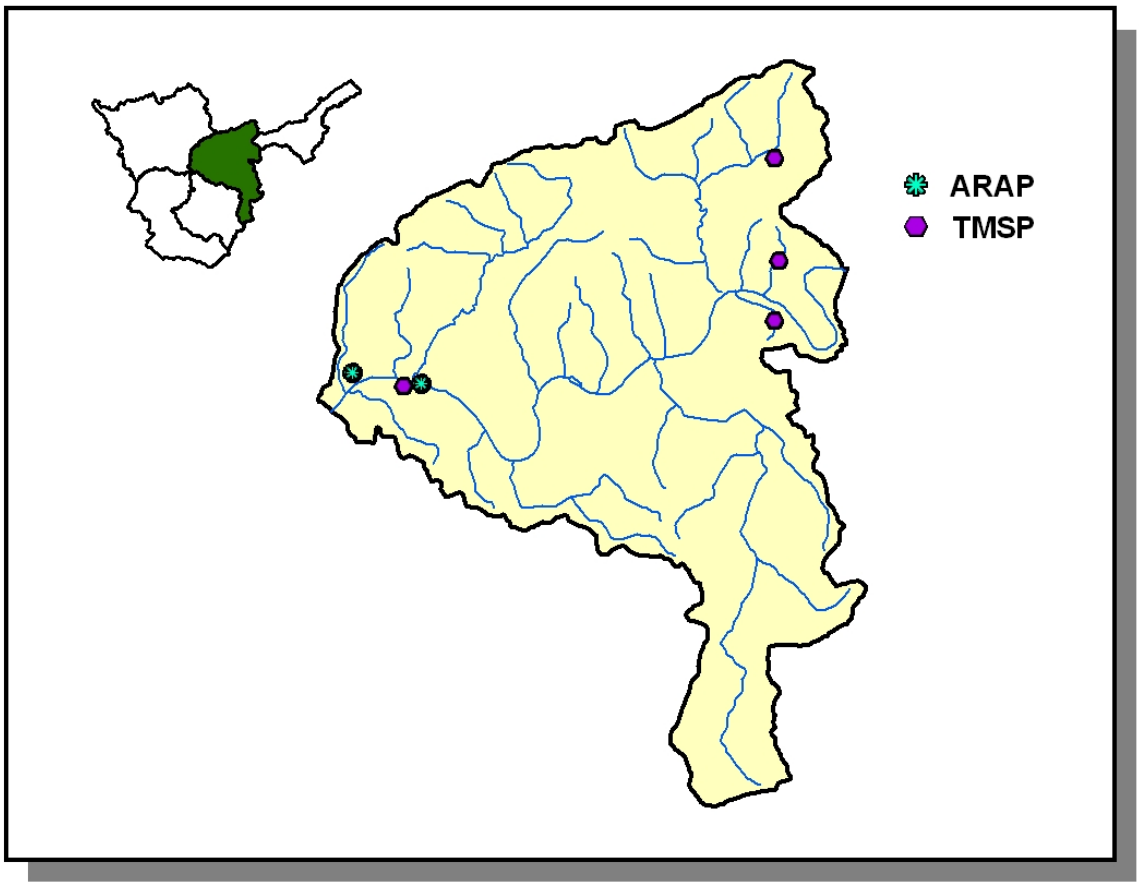

Figure 4-8. Location of Permits Issued in Subwatershed 060101050701. *More information, including the names of Facilities, is provided in Appendix IV.*

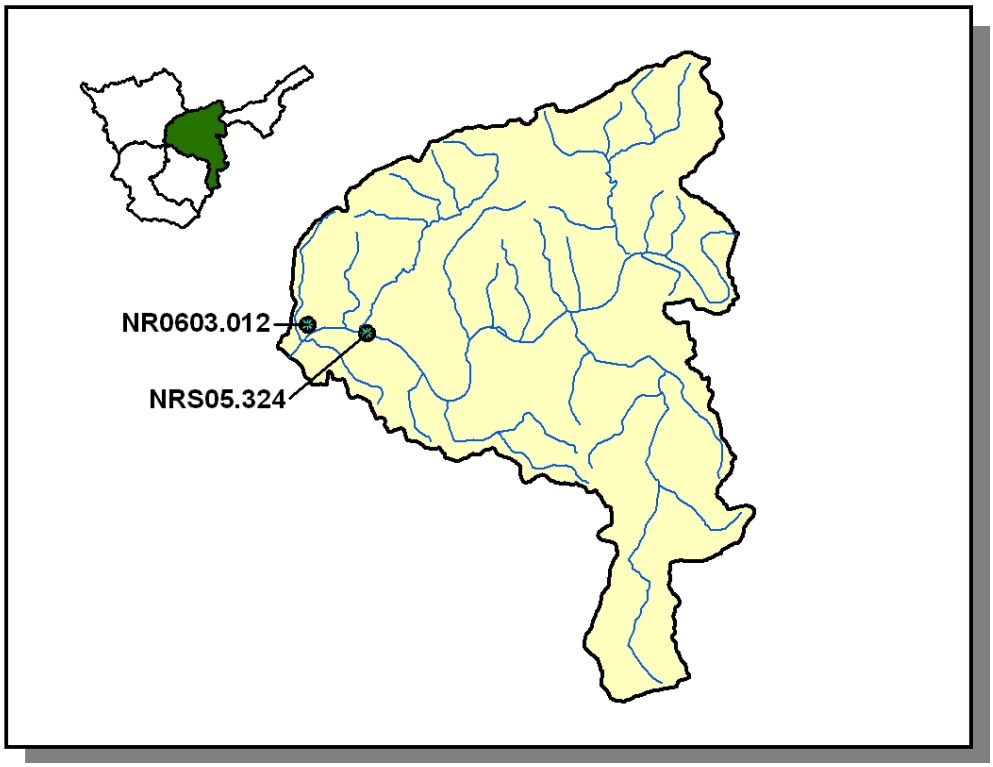

Figure 4-9. Location of ARAP (Aquatic Resource Alteration Permit) Sites in Subwatershed 060101050701. *More information is provided in Appendix IV.*

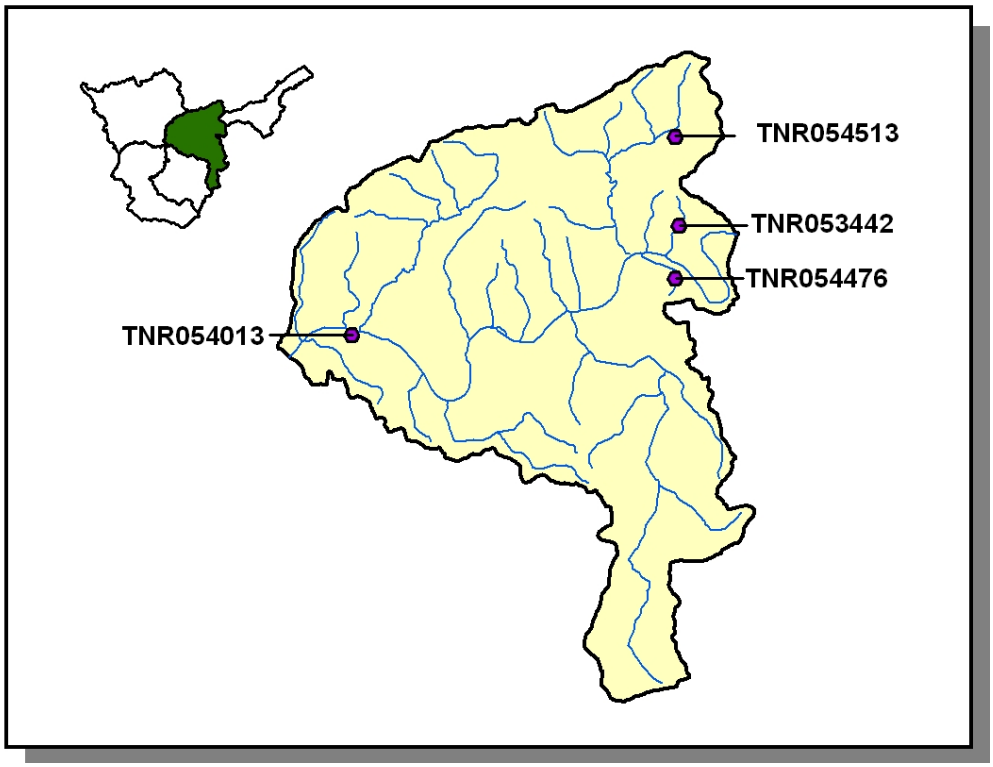

Figure 4-10. Location of TMSP (Tennessee Multi Sector Permit) Sites in Subwatershed 060101050701. *More information is provided in Appendix IV.*

4.2.A.iv. Nonpoint Source Contributions.

LIVESTOCK COUNTS						
County	Beef Cow	Cattle	Milk Cow	Chickens (Layers)	Hogs	Sheep
Cocke	8,169	16,971	1,224	361	269	90
Greene	33,962	72,582	7,282	1,190	495	226

Table 4-4. Summary of Livestock Count Estimates by County. *According to the 1997 Census of Agriculture (http://www.agcensus.usda.gov/), "Cattle" includes heifers, heifer calves, steers, bulls and bull calves; "Chickens" are layers 20 weeks and older.*

	INVENTORY		REMOVAL RATE	
County	Forest Land (thousand acres)	Timber Land (thousand acres)	Growing Stock (million cubic feet)	Sawtimber (million board feet)
Cocke	182.0	163.4	3.7	17.4
Greene	180.0	171.8	2.0	10.5

Table 4-5. Forest Acreage and Annual Removal Rates (1987-1994) by County.

CROPS	TONS/ACRE/YEAR
Tobacco (Row Crops)	15.38
Corn (Row Crops)	6.97
Wheat (Close Grown Cropland)	5.30
Other Vegetable and Truck Crop	3.80
Grass Forbs Legumes Mixed (Pastureland)	1.00
Grass (Pastureland)	0.58
Farmsteads and Ranch Headquarters	0.53
Grass (Hayland)	0.47
Legume (Hayland)	0.26
Legume Grass (Hayland)	0.09

Table 4-6. Annual Estimated Total Soil Loss in Subwatershed 0601010500101.

4.2.B. 060101050702 (Paint Creek).

4.2.B.i. General Description.

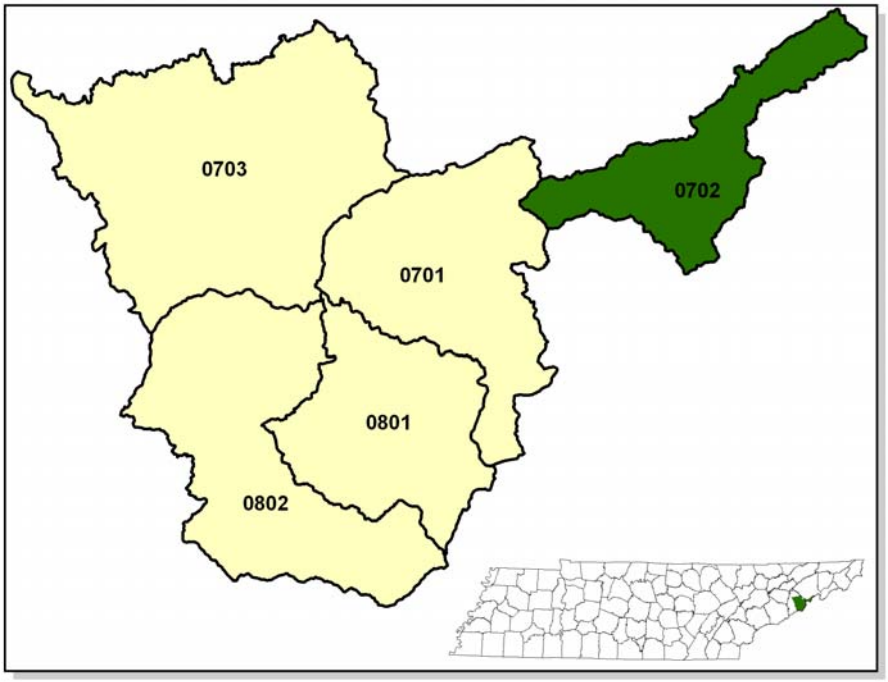

Figure 4-11. Location of Subwatershed 060101050702. *All Upper French Broad River HUC-12 subwatershed boundaries in Tennessee are shown for reference.*

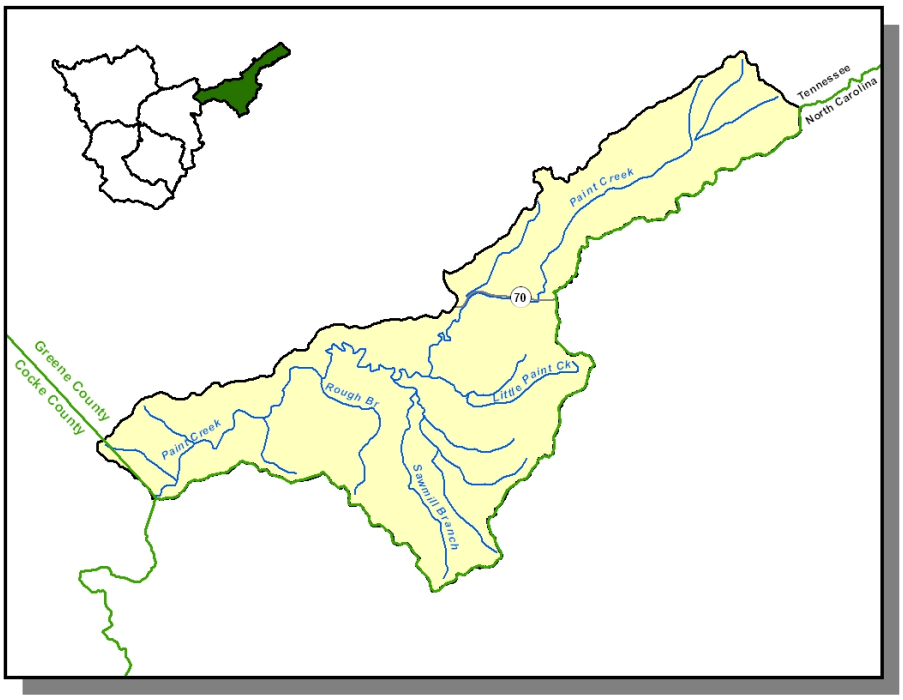

Figure 4-12. Locational Details of Subwatershed 060101050702.

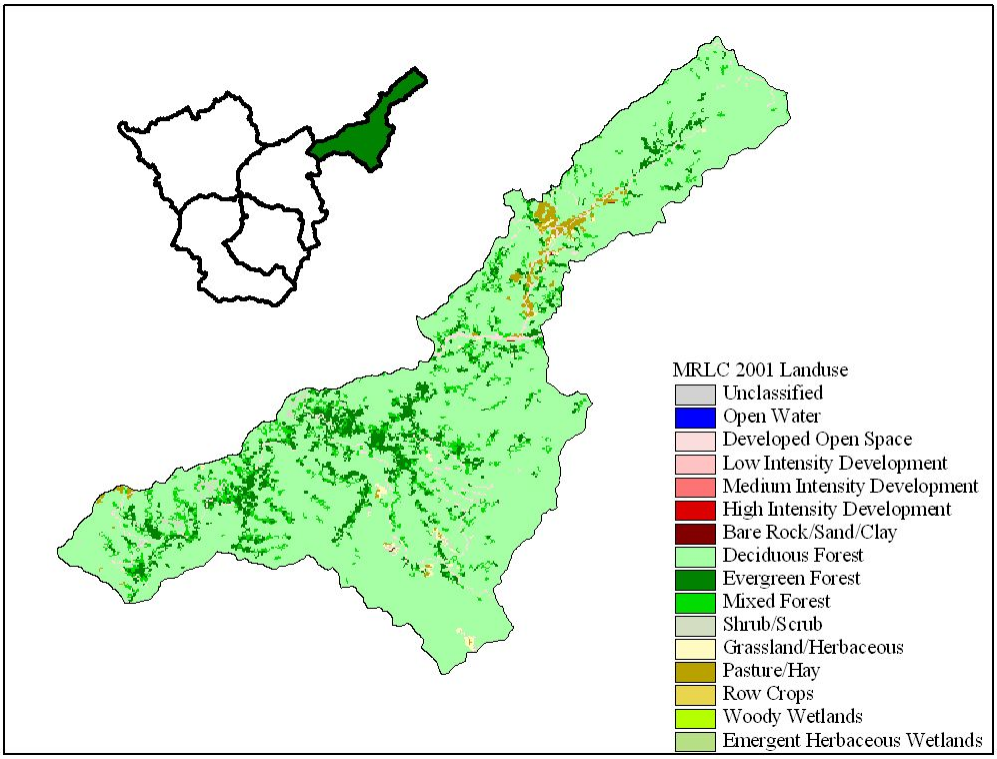

Figure 4-13. Illustration of Land Use Distribution in Subwatershed 060101050702.

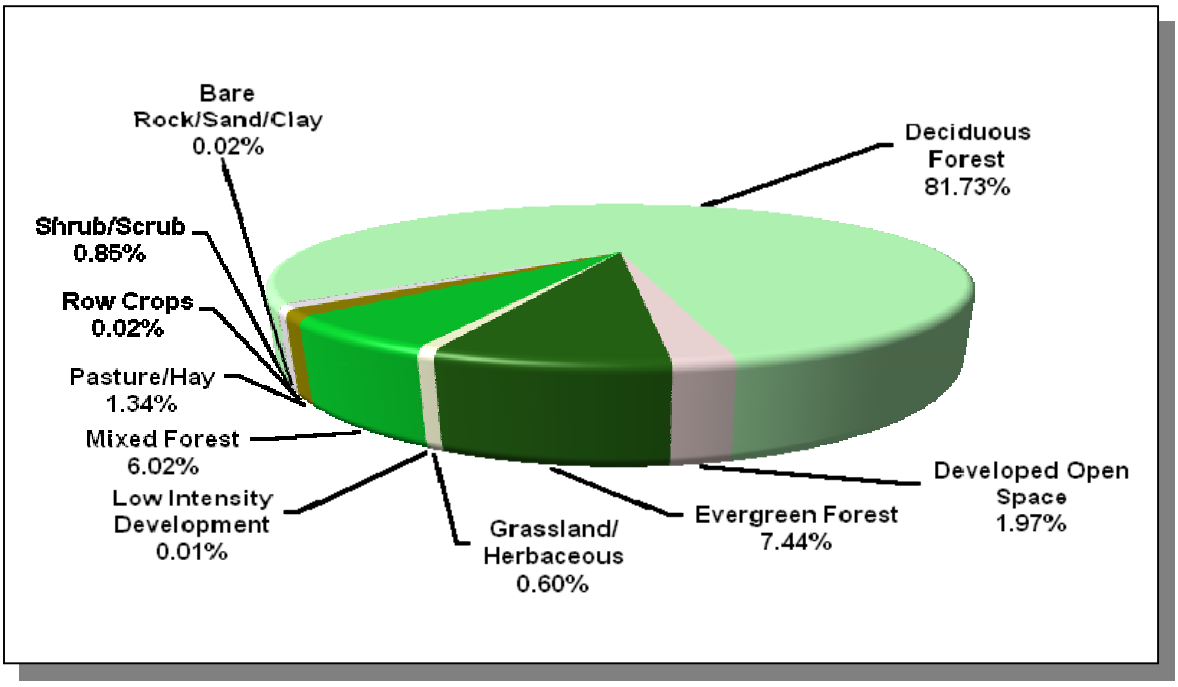

Figure 4-14. Land Use Distribution in Subwatershed 060101050702. *More information is provided in Appendix IV.*

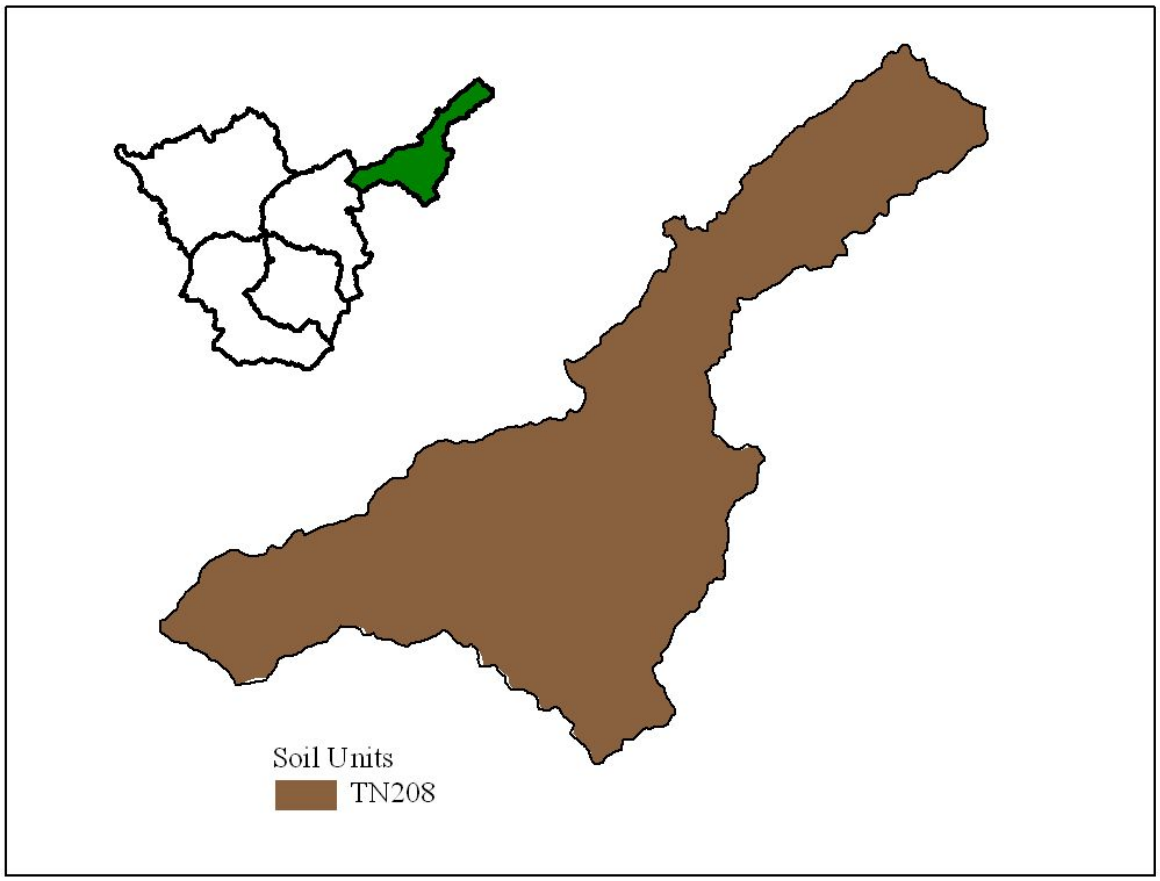

Figure 4-15. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 060101050702.

STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hour)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN208	0.00	C	4.02	4.84	Loam	0.25

Table 4-7. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 060101050702. *The definition of "Hydrologic Group" is provided in Appendix IV.*

	COUNTY POPULATION				ESTIMATED POPULATION IN WATERSHED			
County	1990	1997	2000	% of County in Watershed	1990	1997	2000	% Change (1990-2000)
Cocke	29,141	31,657	33,565	0.15	43	47	49	14.00
Greene	55,853	59,369	62,909	3.91	2,186	2,323	2,462	12.60

Table 4-8. Population Estimates in Subwatershed 060101050702.

4.2.B.ii. USGS Gaging Stations and STORET Sites.

There are no USGS continuous record gaging stations or STORET sites in subwatershed 060101050702.

4.2.B.iii. Permitted Activities.

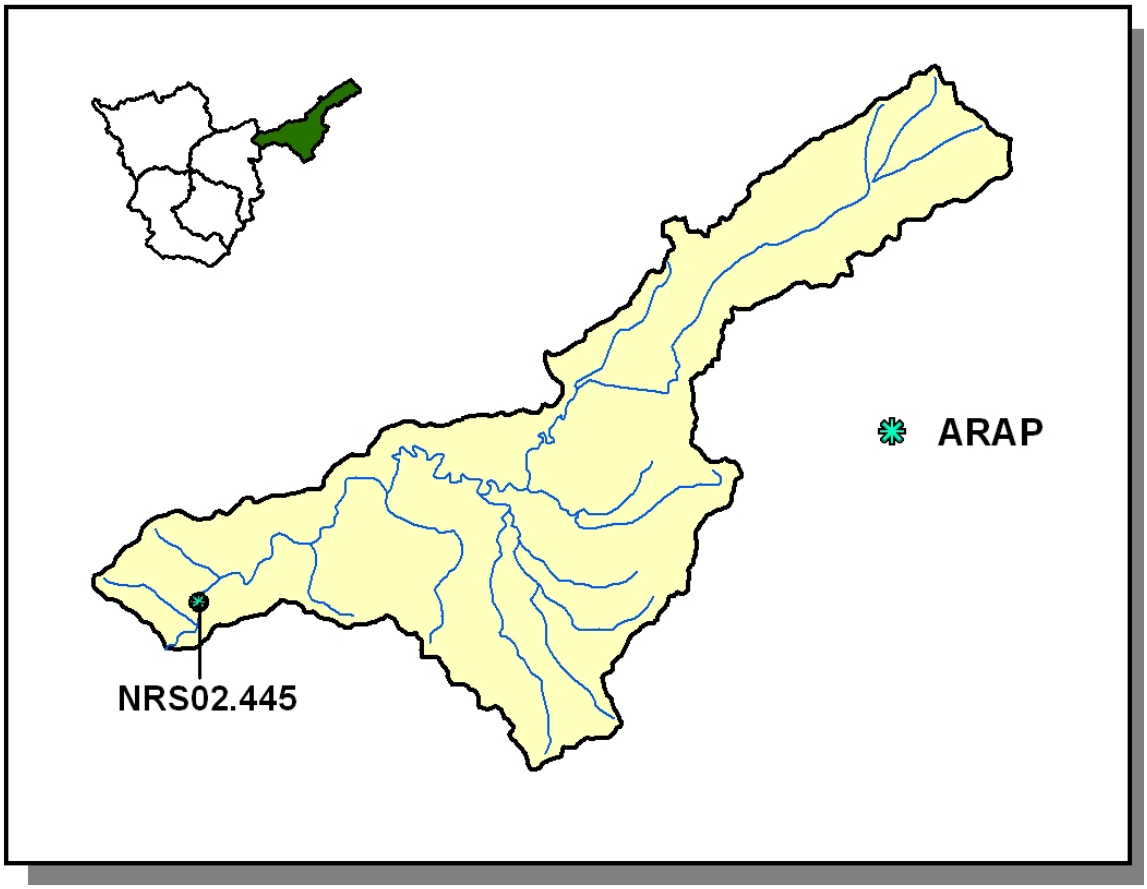

Figure 4-16. Location of Permits Issued in Subwatershed 060101050702. *More information, including the names of Facilities, is provided in Appendix IV.*

4.2.B.iv. Nonpoint Source Contributions.

LIVESTOCK COUNTS						
County	Beef Cow	Cattle	Milk Cow	Chickens (Layers)	Hogs	Sheep
Cocke	8,169	16,971	1,224	361	269	90
Greene	33,962	72,582	7,282	1,190	495	226

Table 4-9. Summary of Livestock Count Estimates by County. *According to the 1997 Census of Agriculture (http://www.agcensus.usda.gov/), "Cattle" includes heifers, heifer calves, steers, bulls and bull calves; "Chickens" are layers 20 weeks and older.*

	INVENTORY		REMOVAL RATE	
County	Forest Land (thousand acres)	Timber Land (thousand acres)	Growing Stock (million cubic feet)	Sawtimber (million board feet)
Cocke	182.0	163.4	3.7	17.4
Greene	180.0	171.8	2.0	10.5

Table 4-10. Forest Acreage and Annual Removal Rates (1987-1994) by County.

CROPS	TONS/ACRE/YEAR
Corn (Row Crops)	16.43
Tobacco (Row Crops)	15.31
Wheat (Close Grown Cropland)	5.30
Other Vegetable and Truck Crop	3.80
Farmsteads and Ranch Headquarters	1.63
Grass Forbs Legumes Mixed (Pastureland)	0.44
Grass (Pastureland)	0.39
Legume Grass (Hayland)	0.33
Legume (Hayland)	0.26
Grass (Hayland)	0.15

Table 4-11. Annual Estimated Total Soil Loss in Subwatershed 060101050702.

4.2.C. 060101050703 (French Broad River).

4.2.C.i. General Description.

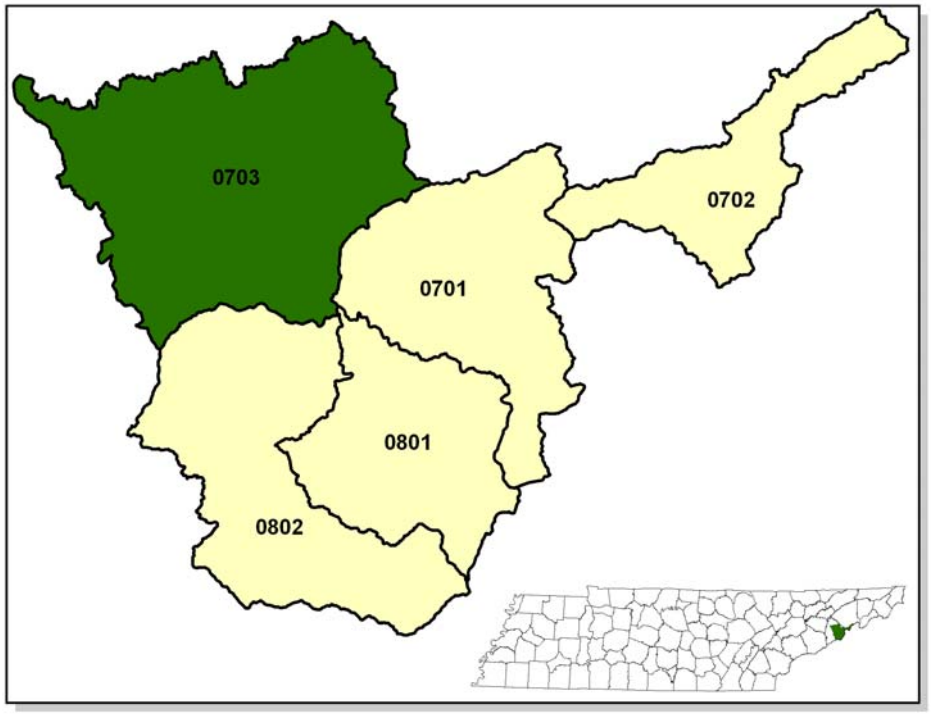

Figure 4-17. Location of Subwatershed 060101050703. *All Upper French Broad River HUC-12 subwatershed boundaries in Tennessee are shown for reference.*

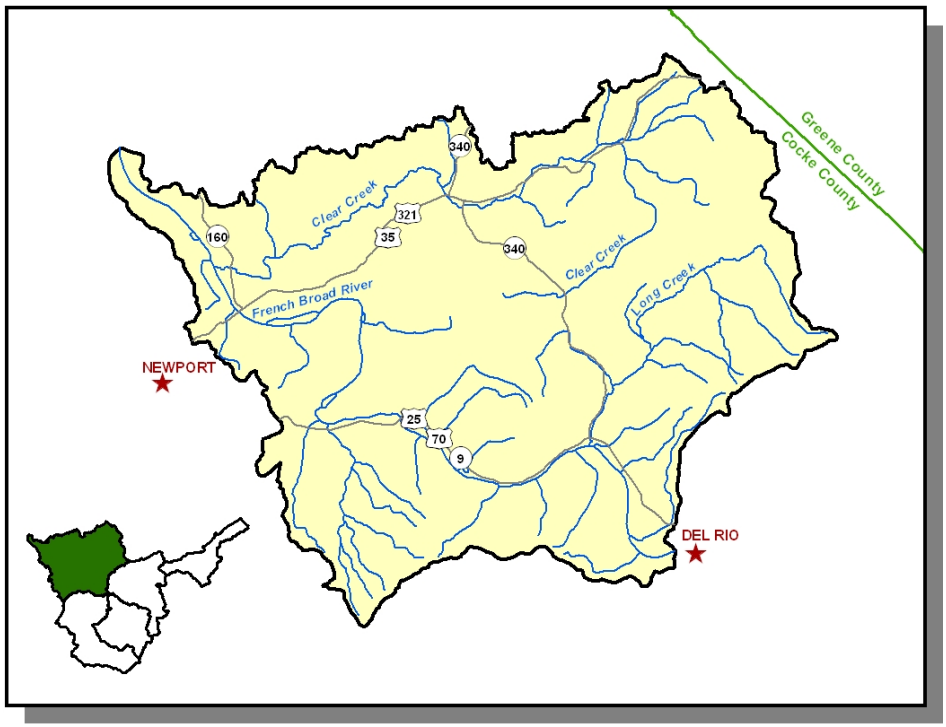

Figure 4-18. Locational Details of Subwatershed 060101050703.

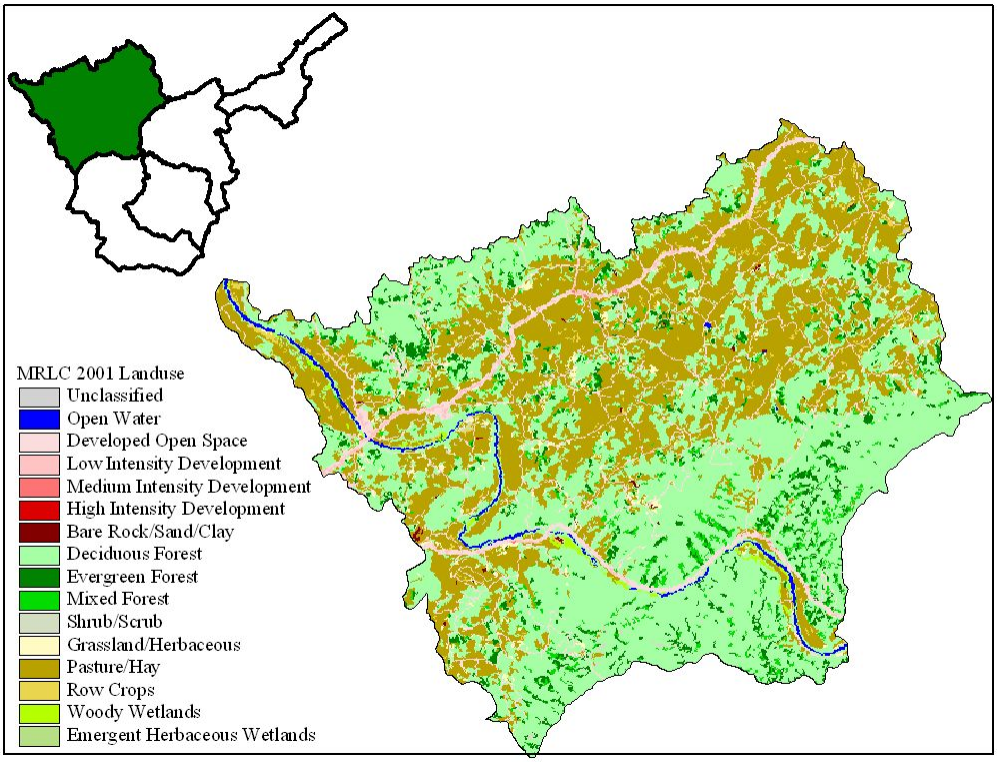

Figure 4-19. Illustration of Land Use Distribution in Subwatershed 060101050703.

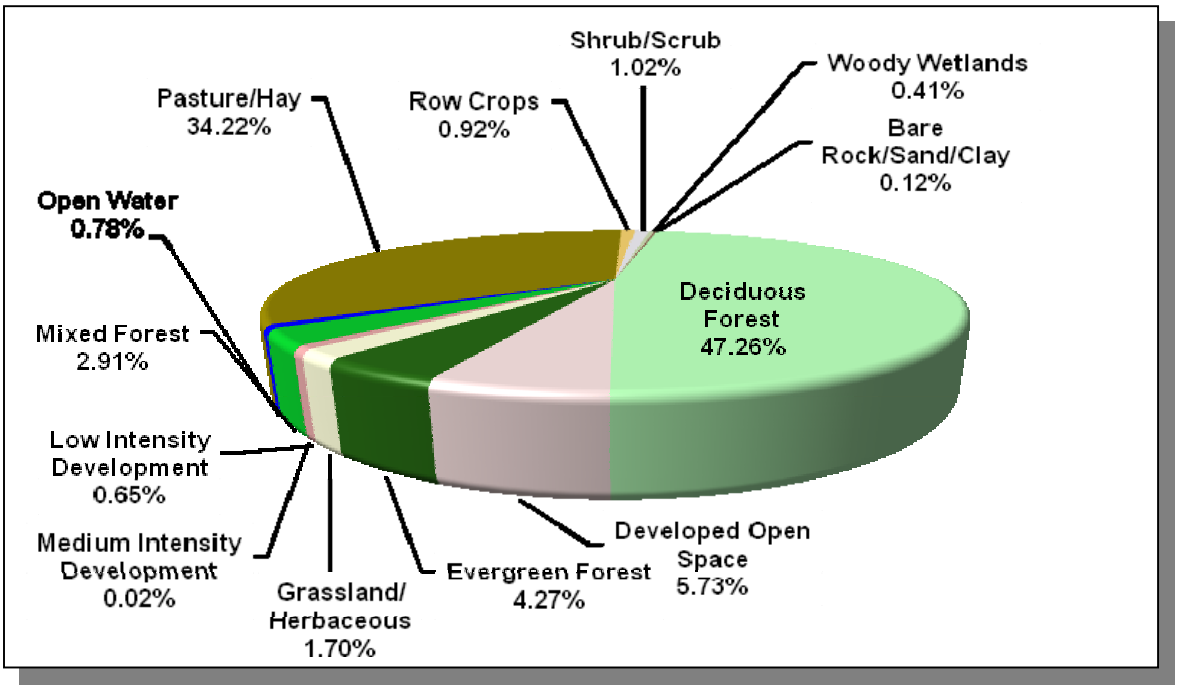

Figure 4-20. Land Use Distribution in Subwatershed 060101050703. *More information is provided in Appendix IV.*

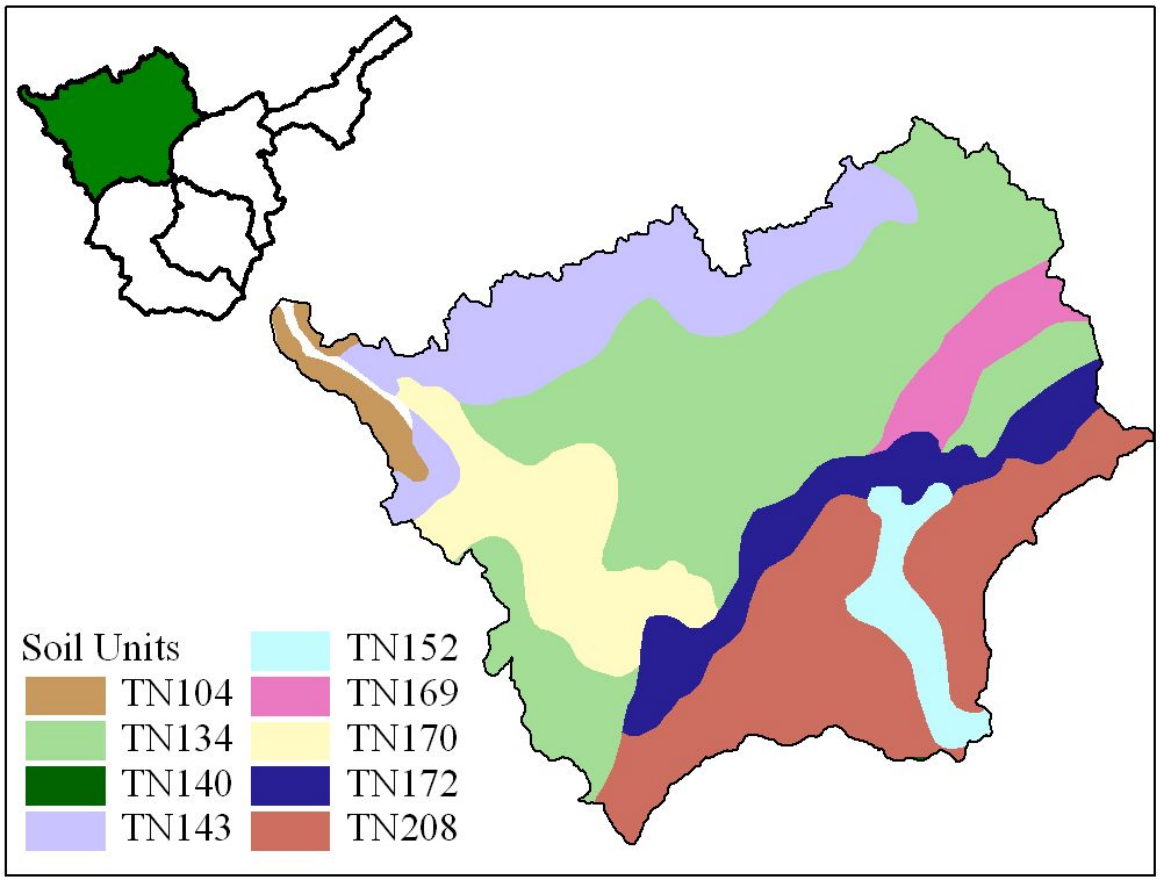

Figure 4-21. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 060101050703.

STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hour)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN104	1	C	1.20	5.23	Silty Loam	0.38
TN134	0	B	1.38	5.18	Loam	0.31
TN140	0	B	3.85	4.85	Sandy Loam	0.21
TN143	0	C	1.22	6.44	Loam	0.32
TN152	0	B	2.11	5.26	Loam	0.31
TN169	0	C	3.29	4.75	Loam	0.40
TN170	0	B	1.14	4.37	Loam	0.25
TN172	0	B	3.87	5.13	Loam	0.26
TN208	0	C	4.02	4.84	Loam	0.25

Table 4-12. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 060101050703. *The definition of "Hydrologic Group" is provided in Appendix IV.*

	COUNTY POPULATION				ESTIMATED POPULATION IN WATERSHED			
County	1990	1997	2000	% of County in Watershed	1990	1997	2000	% Change (1990-2000)
Cocke	29,141	31,657	33,565	15.22	4,435	4,818	5,108	15.20

Table 4-13. Population Estimates in Subwatershed 060101050703.

			NUMBER OF HOUSING UNITS			
Populated Place	County	Population	Total	Public Sewer	Septic Tank	Other
Parrottsville	Cocke	117	42	4	38	0

Table 4-14. Housing and Sewage Disposal Practices of Select Communities in Subwatershed 060101050703.

4.2.C.ii. USGS Gaging Stations and STORET Sites.

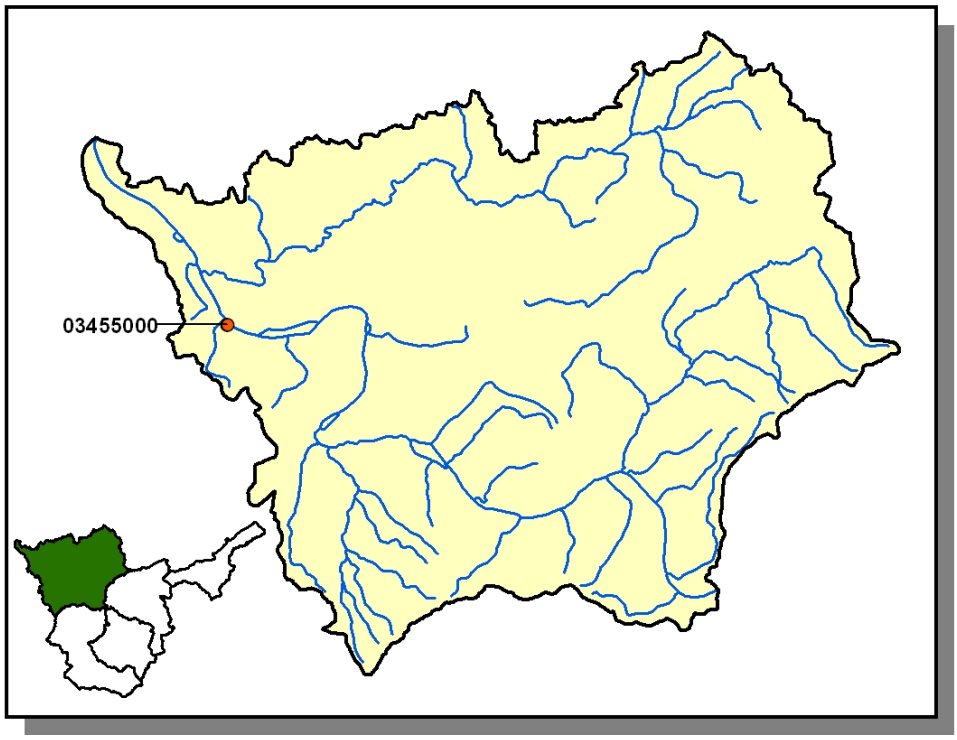

Figure 4-22. Location of USGS Continuous Record Gaging Stations in Subwatershed 060101050703. *More information is provided in Appendix IV.*

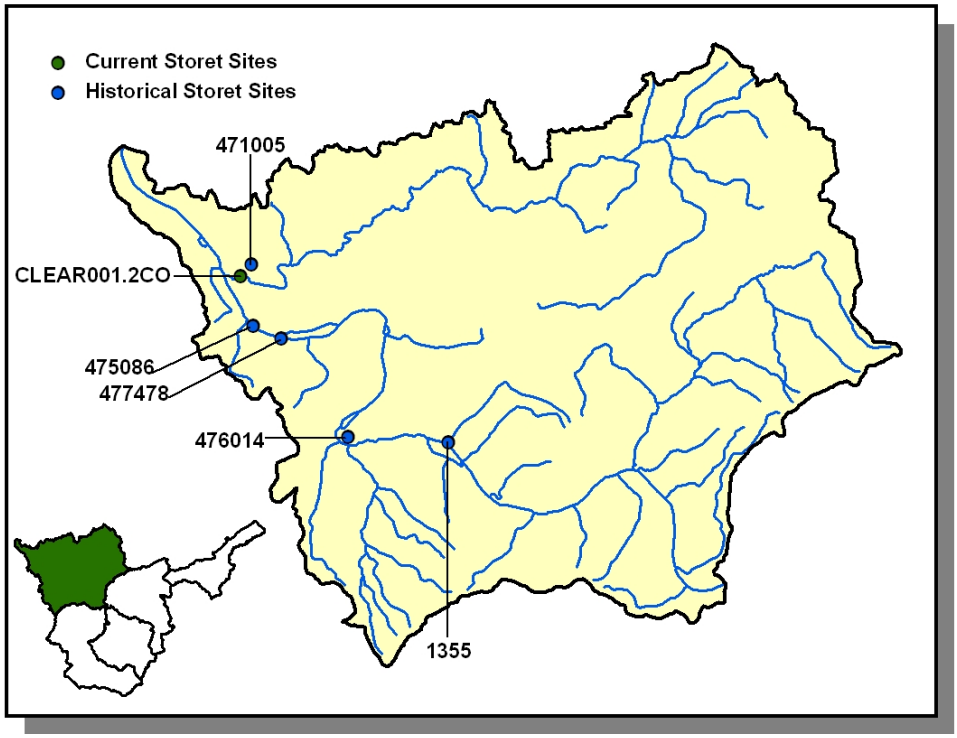

Figure 4-23. Location of Monitoring Sites in EPA's STORET Database in Subwatershed 060101050703. *More information, including site names and locations, is provided in Appendix IV.*

4.2.C.iii. Permitted Activities.

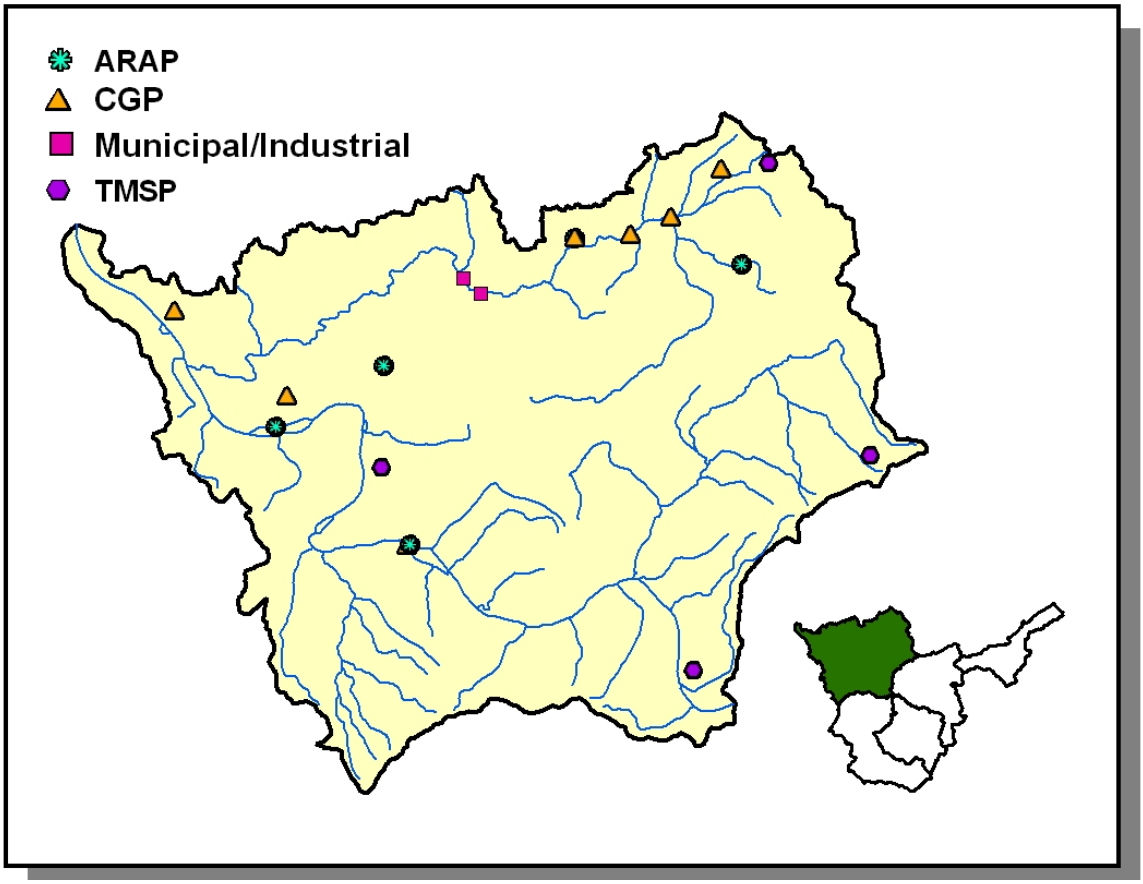

Figure 4-24. Location of Permits Issued in Subwatershed 060101050703. *More information, including the names of Facilities, is provided in Appendix IV.*

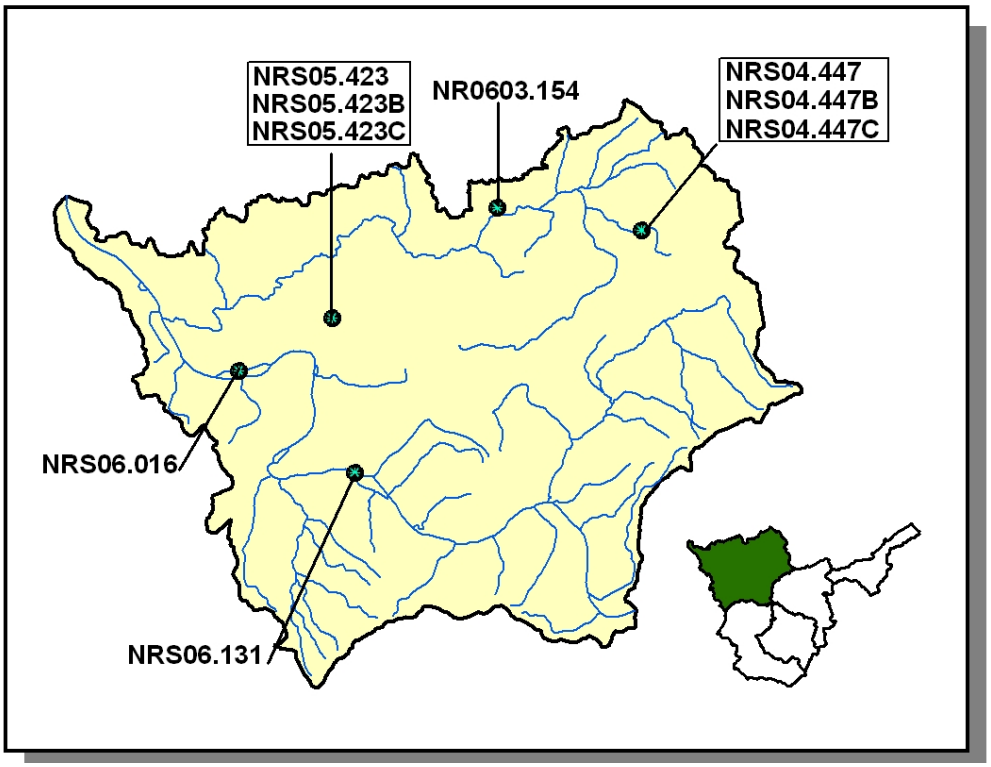

Figure 4-25. Location of ARAP (Aquatic Resource Alteration Permit) Sites in Subwatershed 060101050703. *More information is provided in Appendix IV.*

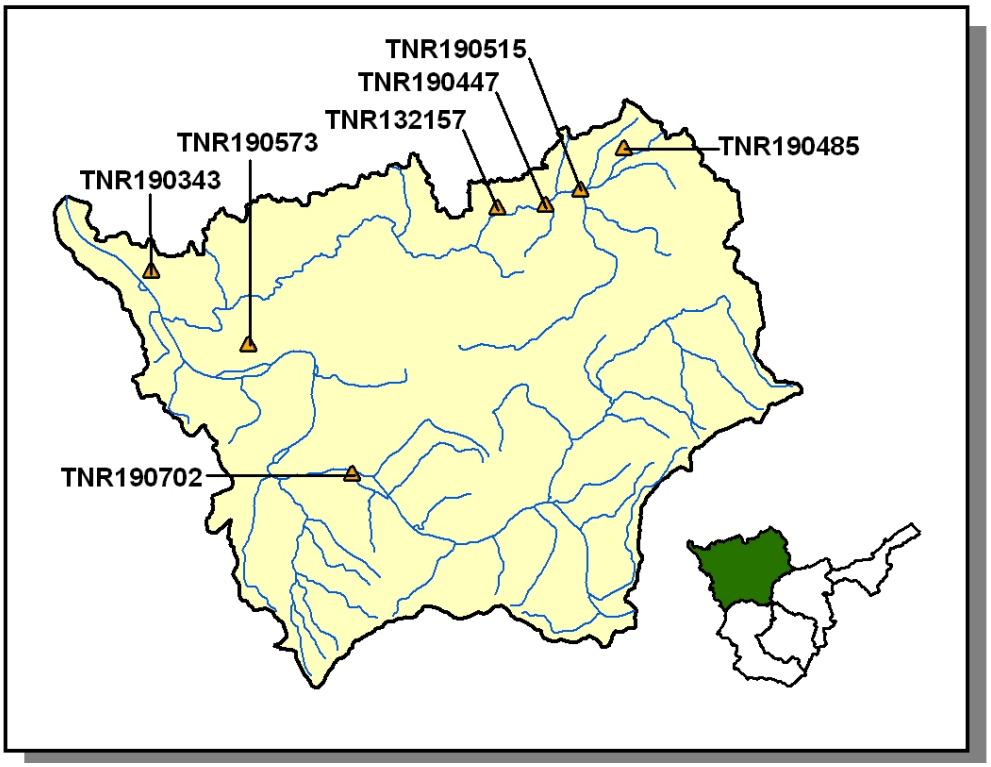

Figure 4-26. Location of CGP (Construction General Permit) Sites in Subwatershed 060101050703. *More information is provided in Appendix IV.*

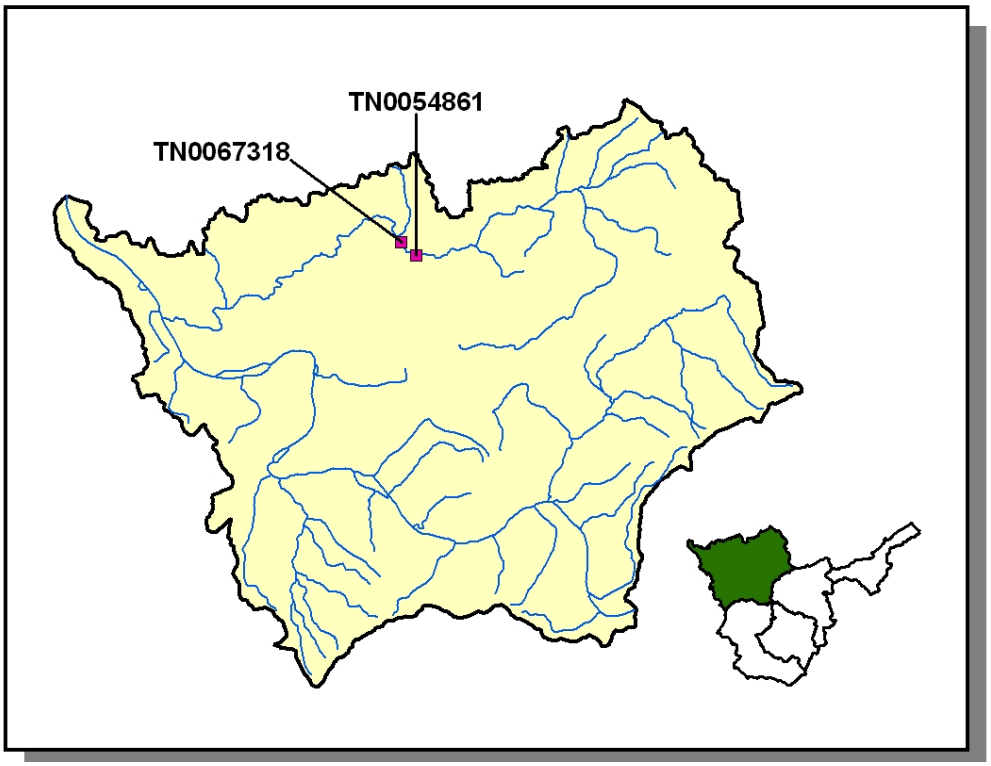

Figure 4-27. Location of Permitted Municipal and Industrial Facilities in Subwatershed 060101050703. *More information, including the name of the facility is provided in Appendix IV.*

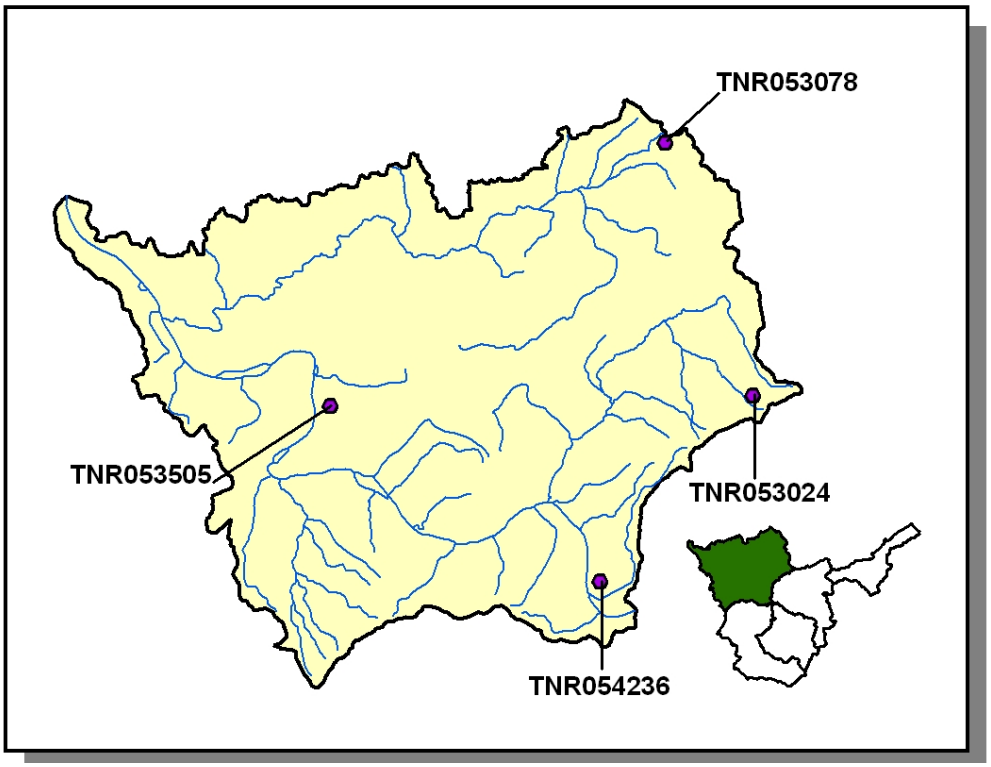

Figure 4-28. Location of Active TMSP (Tennessee Multi Sector Permit) Sites in Subwatershed 060101050703. *More information is provided in Appendix IV.*

4.2.C.iv. Nonpoint Source Contributions.

LIVESTOCK COUNTS						
County	Beef Cow	Cattle	Milk Cow	Chickens (Layers)	Hogs	Sheep
Cocke	8,169	16,971	1,224	361	269	90

Table 4-15. Summary of Livestock Count Estimates by County. *According to the 1997 Census of Agriculture (http://www.agcensus.usda.gov/), "Cattle" includes heifers, heifer calves, steers, bulls and bull calves; "Chickens" are layers 20 weeks and older.*

	INVENTORY		REMOVAL RATE	
County	Forest Land (thousand acres)	Timber Land (thousand acres)	Growing Stock (million cubic feet)	Sawtimber (million board feet)
Cocke	182.0	163.4	3.7	17.4

Table 4-16. Forest Acreage and Annual Removal Rates (1987-1994) by County.

CROPS	TONS/ACRE/YEAR
Tobacco (Row Crops)	15.78
Corn (Row Crops)	6.60
Wheat (Close Grown Cropland)	5.30
Grass Forbs Legumes Mixed (Pastureland)	0.85
Farmsteads and Ranch Headquarters	0.51
Grass (Hayland)	0.48
Grass (Pastureland)	0.35
Legume Grass (Hayland)	0.08

Table 4-17. Annual Estimated Total Soil Loss in Subwatershed 060101050703.

4.2.D. 060101050801 (Trail Fork of Big Creek).

4.2.D.i. General Description.

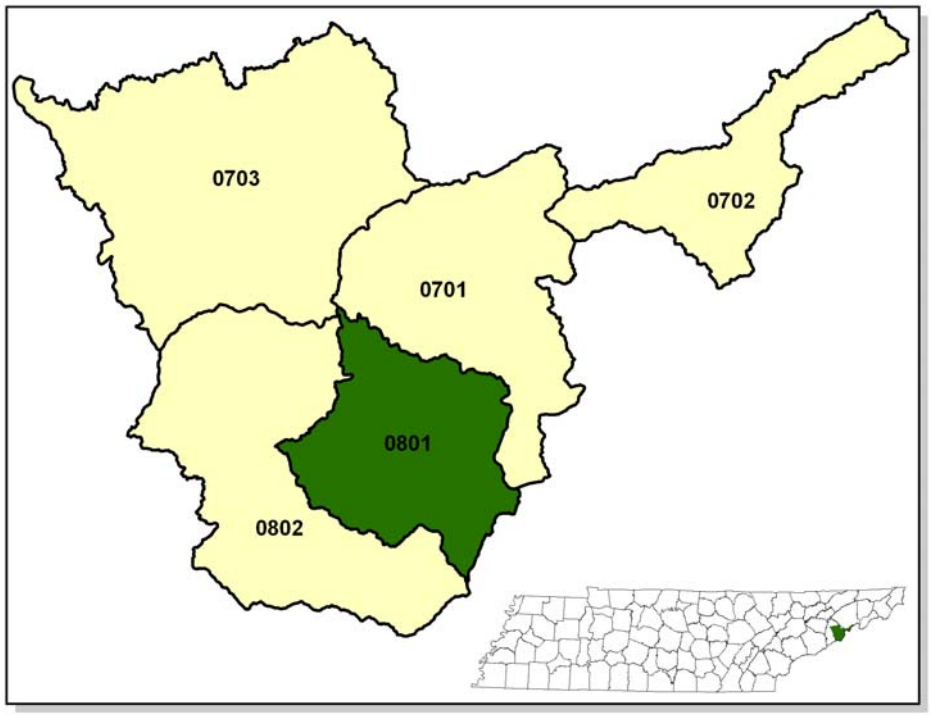

Figure 4-29. Location of Subwatershed 060101050801 *All Upper French Broad River HUC-12 subwatershed boundaries in Tennessee are shown for reference.*

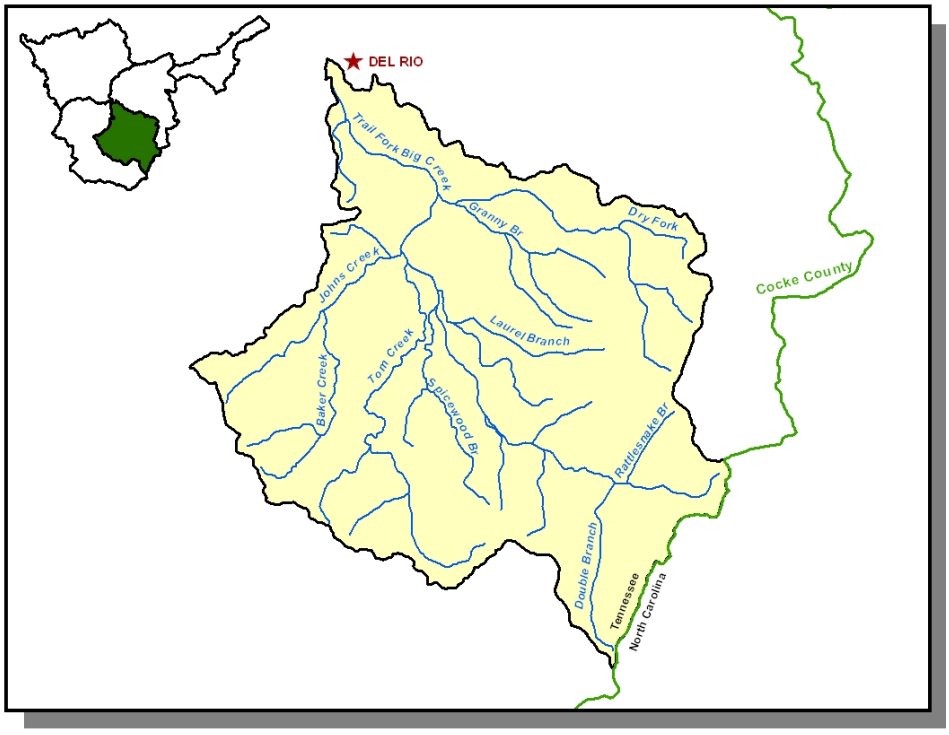

Figure 4-30. Locational Details of Subwatershed 060101050801.

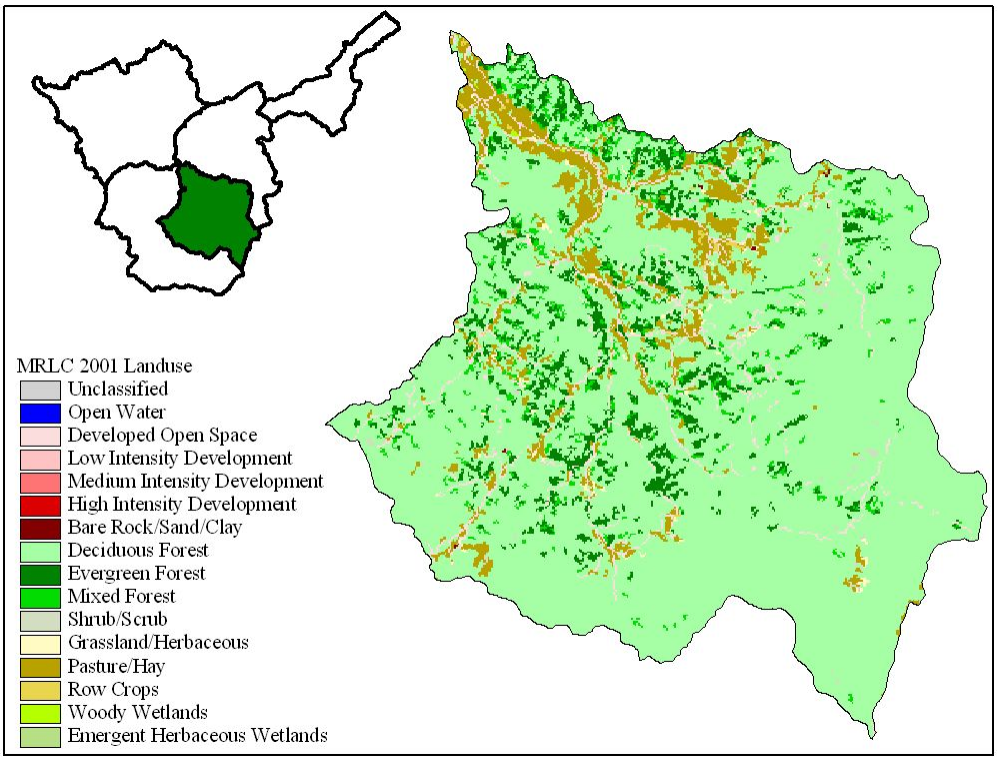

Figure 4-31. Illustration of Land Use Distribution in Subwatershed 060101050801.

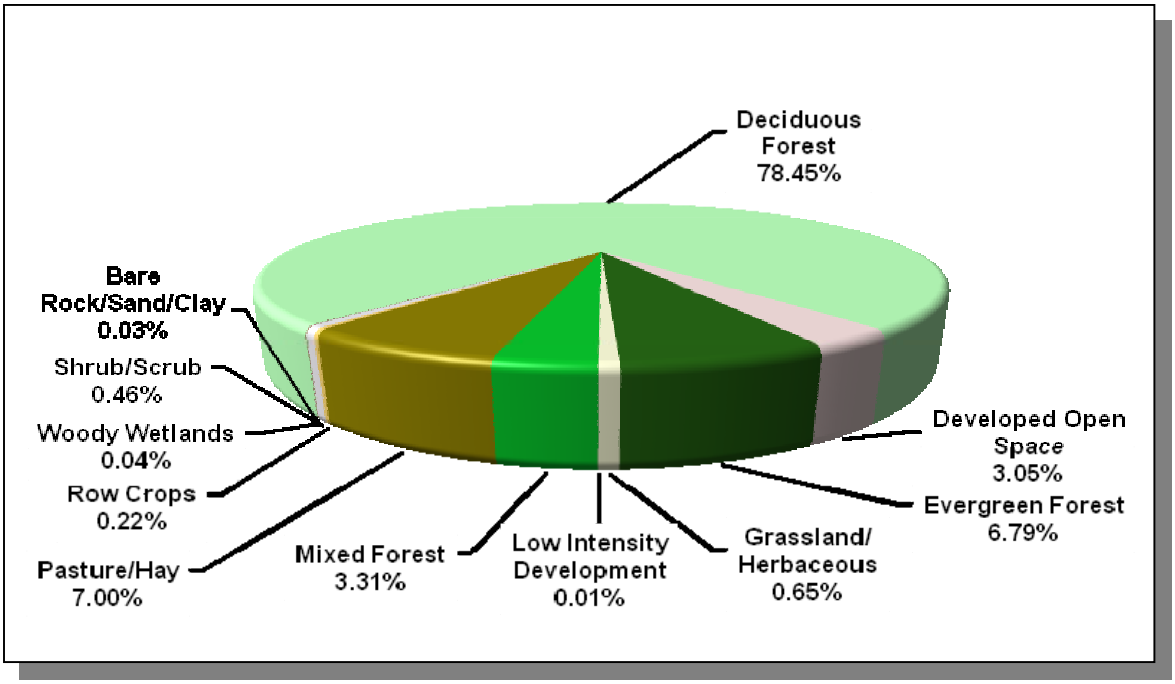

Figure 4-32. Land Use Distribution in Subwatershed 060101050801. *More information is provided in Appendix IV.*

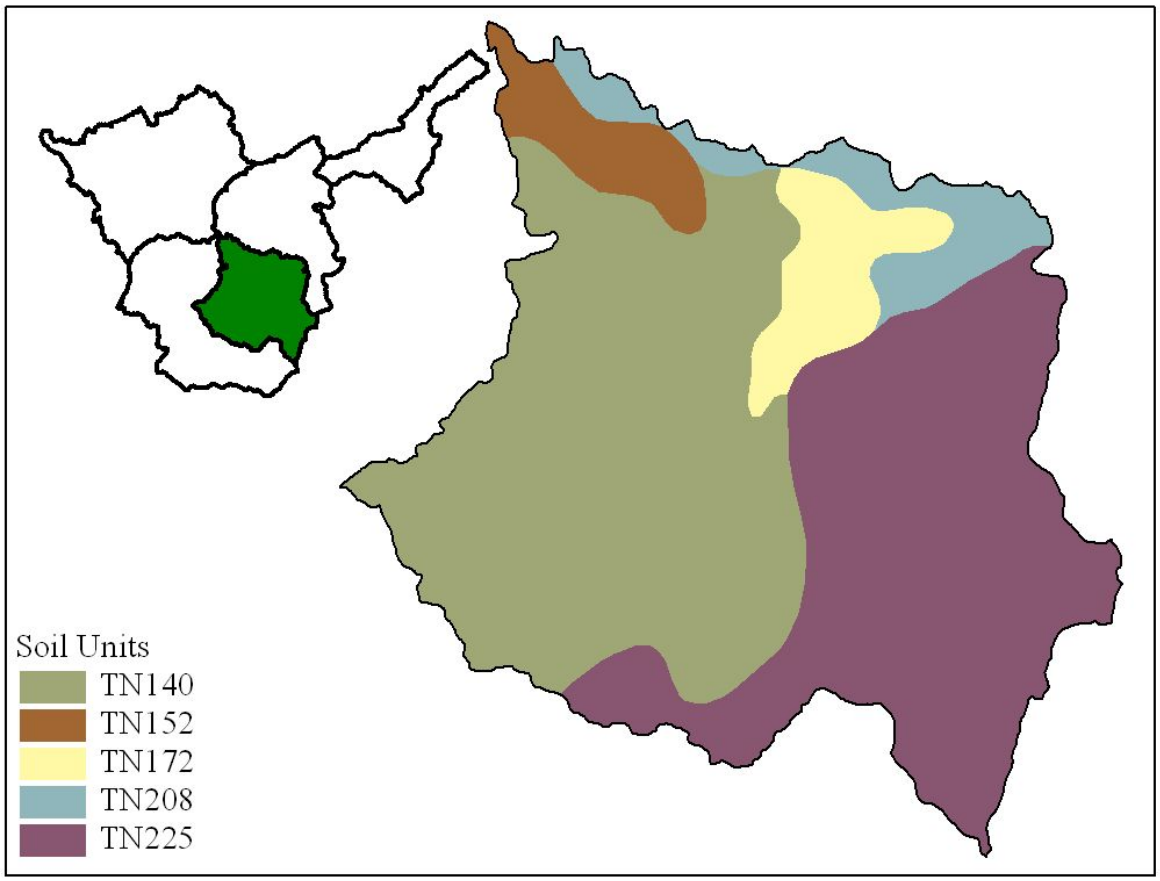

Figure 4-33. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 060101050801

STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hour)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN140	0	B	3.85	4.85	Sandy Loam	0.21
TN152	0	B	2.11	5.26	Loam	0.31
TN172	0	B	3.87	5.13	Loam	0.26
TN208	0	C	4.02	4.84	Loam	0.25
TN225	0	B	3.90	5.03	Sandy Loam	0.22

Table 4-18. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 06010105801. *The definition of "Hydrologic Group" is provided in Appendix IV.*

	COUNTY POPULATION				ESTIMATED POPULATION IN WATERSHED			
County	1990	1997	2000	% of County in Watershed	1990	1997	2000	% Change (1990-2000)
Cocke	29,141	31,657	33,565	7.15	2,085	2,265	2,401	15.20

Table 4-19. Population Estimates in Subwatershed 060101050801.

4.2.D.ii. USGS Gaging Stations and STORET Sites.

There are no USGS continuous record gaging stations located in subwatershed 060101050801.

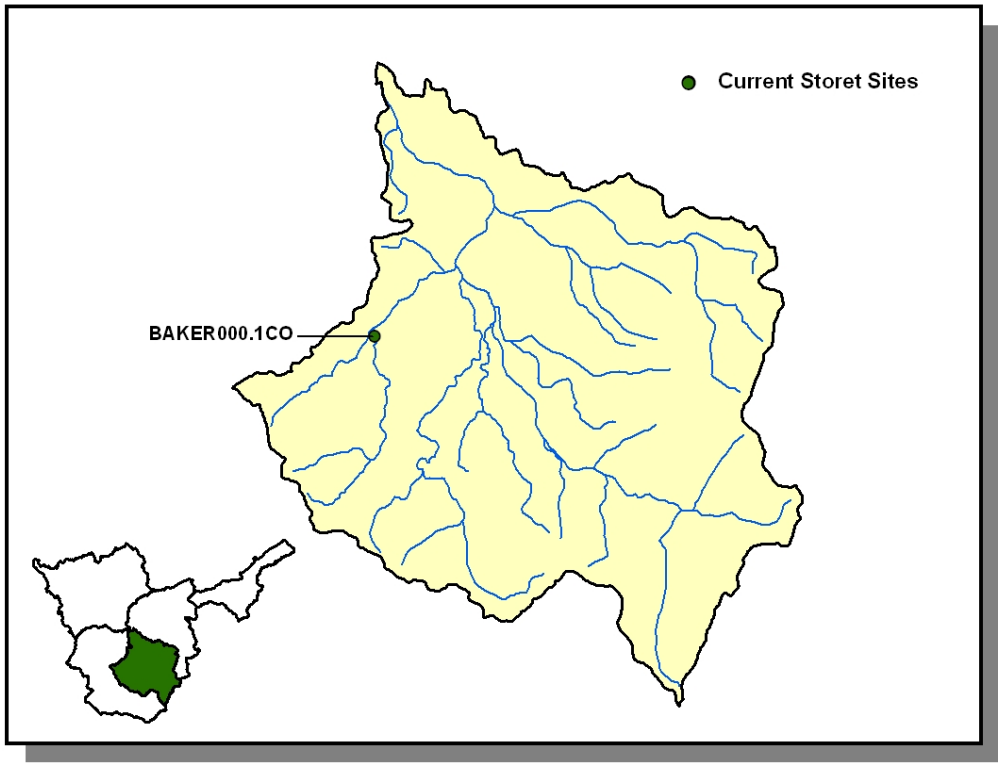

Figure 4-34. Location of Monitoring Sites in EPA's STORET Database in Subwatershed 060101050801. *More information, including site names and locations, is provided in Appendix IV.*

4.2.D.iii. Permitted Activities.

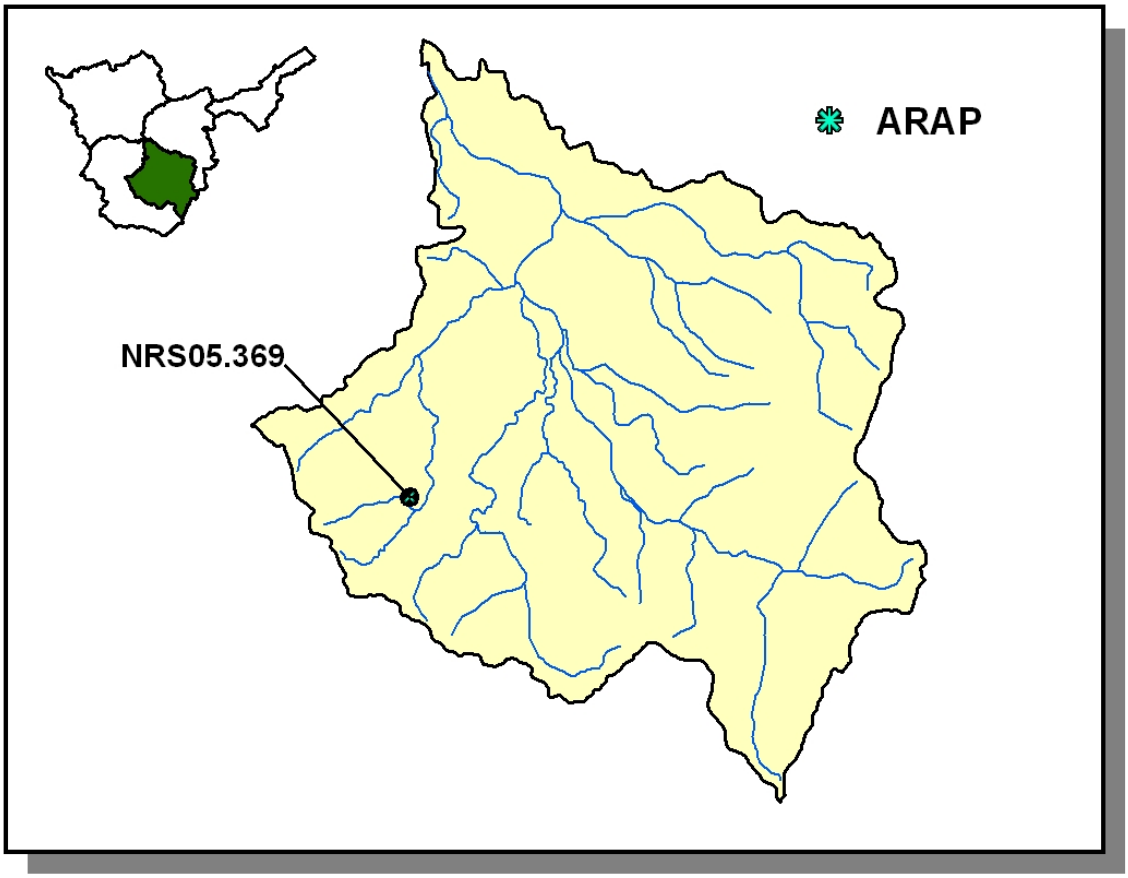

Figure 4-35. Location of Permits Issued in Subwatershed 060101050801. *More information, including the names of Facilities, is provided in Appendix IV.*

4.2.D.iv. Nonpoint Source Contributions.

LIVESTOCK COUNTS						
County	Beef Cow	Cattle	Milk Cow	Chickens (Layers)	Hogs	Sheep
Cocke	8,169	16,971	1,224	361	269	90

Table 4-20. Summary of Livestock Count Estimates by County. *According to the 1997 Census of Agriculture (http://www.agcensus.usda.gov/), "Cattle" includes heifers, heifer calves, steers, bulls and bull calves; "Chickens" are layers 20 weeks and older.*

	INVENTORY		REMOVAL RATE	
County	Forest Land (thousand acres)	Timber Land (thousand acres)	Growing Stock (million cubic feet)	Sawtimber (million board feet)
Cocke	182.0	163.4	3.7	17.4

Table 4-21. Forest Acreage and Annual Removal Rates (1987-1994) in Smith County.

CROPS	TONS/ACRE/YEAR
Tobacco (Row Crops)	15.77
Corn (Row Crops)	6.60
Wheat (Close Grown Cropland)	5.30
Grass Forbs Legumes Mixed (Pastureland)	0.85
Farmsteads and Ranch Headquarters	0.51
Grass (Hayland)	0.48
Grass (Pastureland)	0.36
Legume Grass (Hayland)	0.08

Table 4-22. Annual Estimated Total Soil Loss in Subwatershed 060101050801.

4.2.E. 060101050802 (Gulf Fork of Big Creek).

4.2.E.i. General Description.

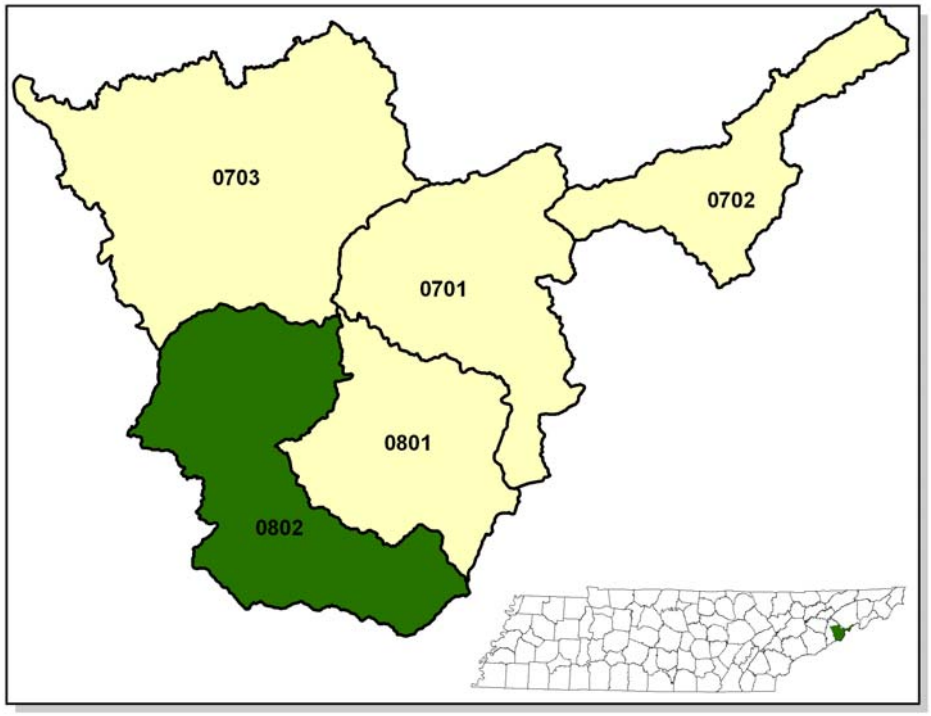

Figure 4-36. Location of Subwatershed 060101050802. *All Upper French Broad River HUC-12 subwatershed boundaries in Tennessee are shown for reference.*

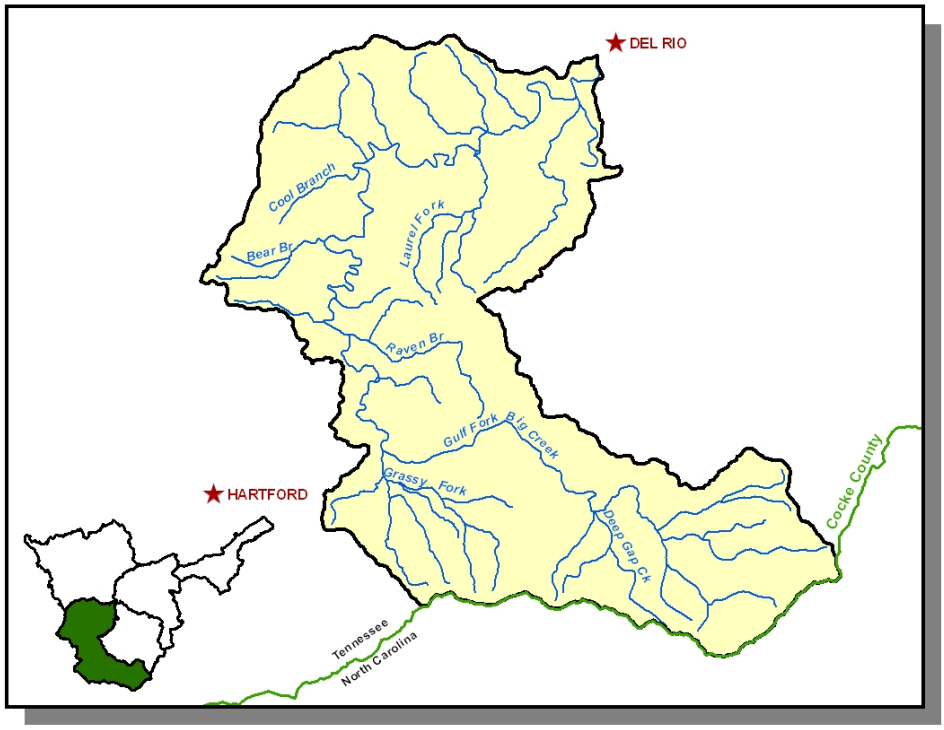

Figure 4-37. Locational Details of Subwatershed 060101050802.

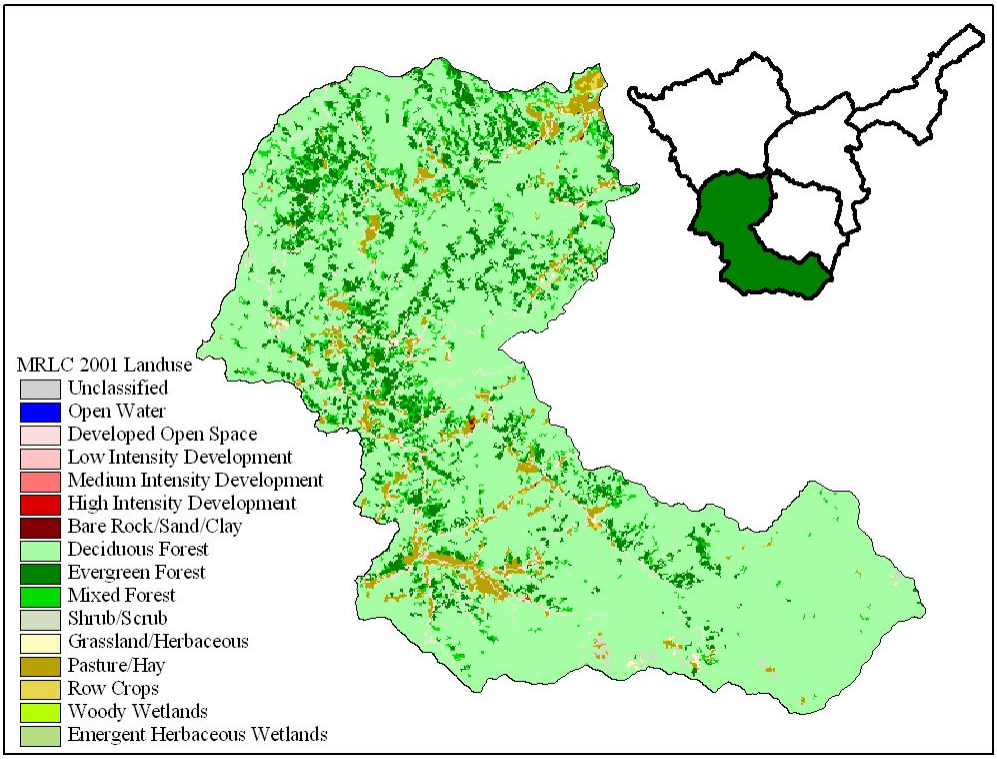

Figure 4-38. Illustration of Land Use Distribution in Subwatershed 060101050802.

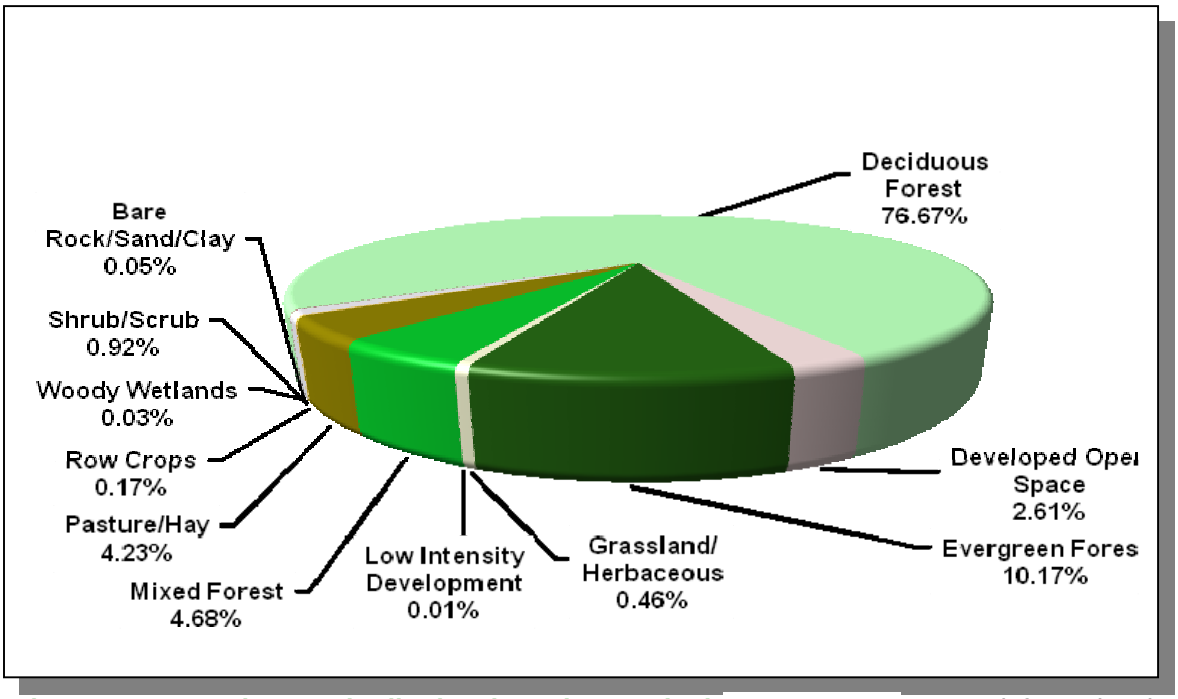

Figure 4-39. Land Use Distribution in Subwatershed 060101050802. *More information is provided in Appendix IV.*

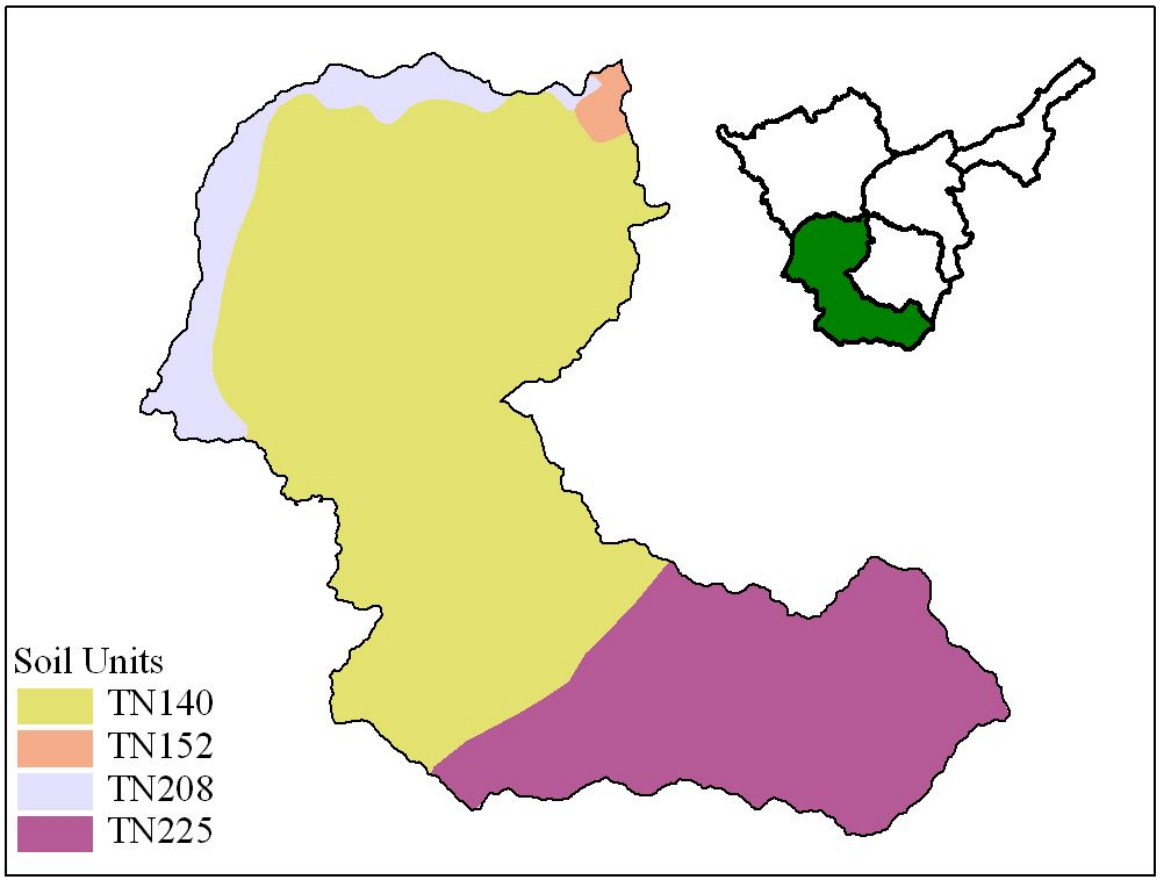

Figure 4-40. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 060101050802.

STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hour)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN140	0	B	3.85	4.85	Sandy Loam	0.21
TN152	0	B	2.11	5.26	Loam	0.31
TN172	0	B	3.87	5.13	Loam	0.26
TN208	0	C	4.02	4.84	Loam	0.25
TN225	0	B	3.90	5.03	Sandy Loam	0.22

Table 4-23. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 060101050802. *The definition of "Hydrologic Group" is provided in Appendix IV.*

	COUNTY POPULATION				ESTIMATED POPULATION IN WATERSHED			
County	1990	1997	2000	% of County in Watershed	1990	1997	2000	% Change (1990-2000)
Cocke	29,141	31,657	33,565	10.6	3,088	3,355	3,557	15.2

Table 4-24. Population Estimates in Subwatershed 060101050802.

4.2.E.ii. USGS Gaging Stations and STORET Sites.

There are no USGS continuous record gaging stations in subwatershed 060101050802.

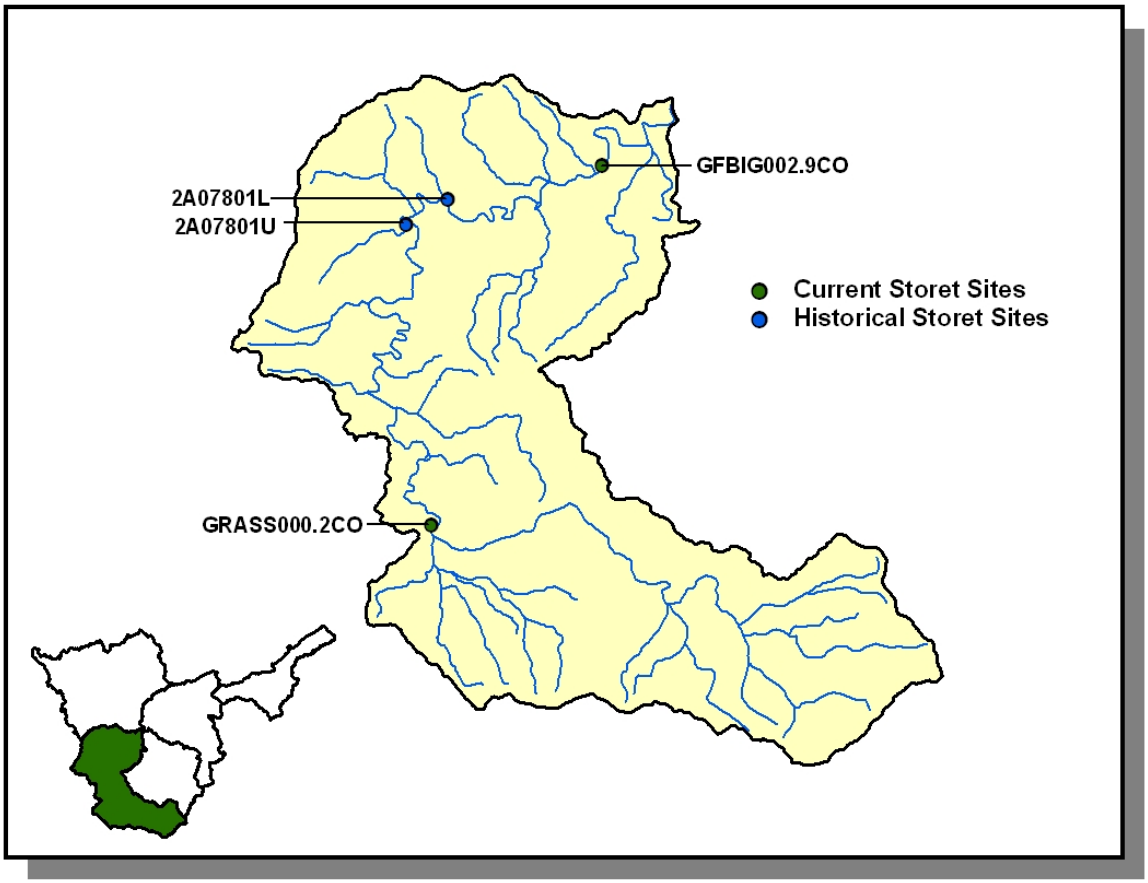

Figure 4-41. Location of Monitoring Sites in EPA's STORET Database in Subwatershed 060101050802. *More information, including site names and locations, is provided in Appendix IV.*

4.2.E.iii. Permitted Activities.

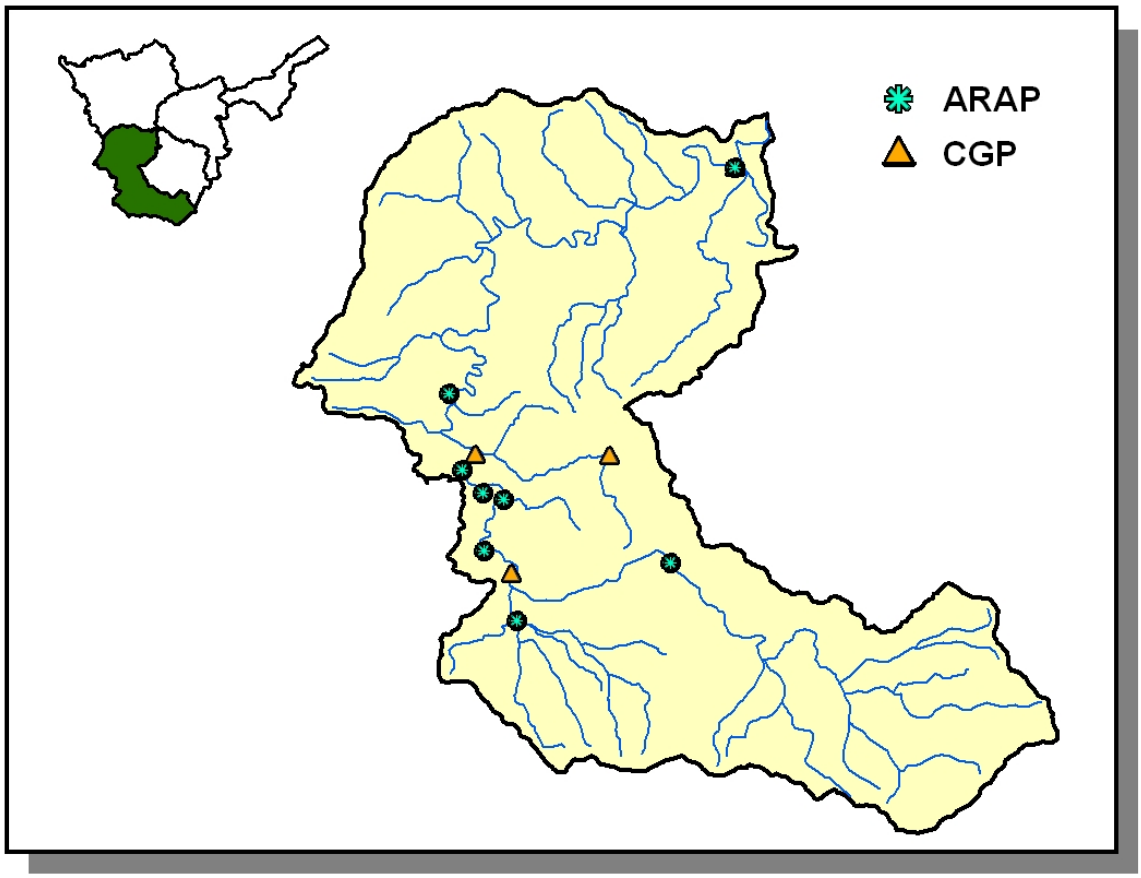

Figure 4-42. Location of Permits Issued in Subwatershed 060101050802 *Information, including the names of Facilities, is provided in Appendix IV.*

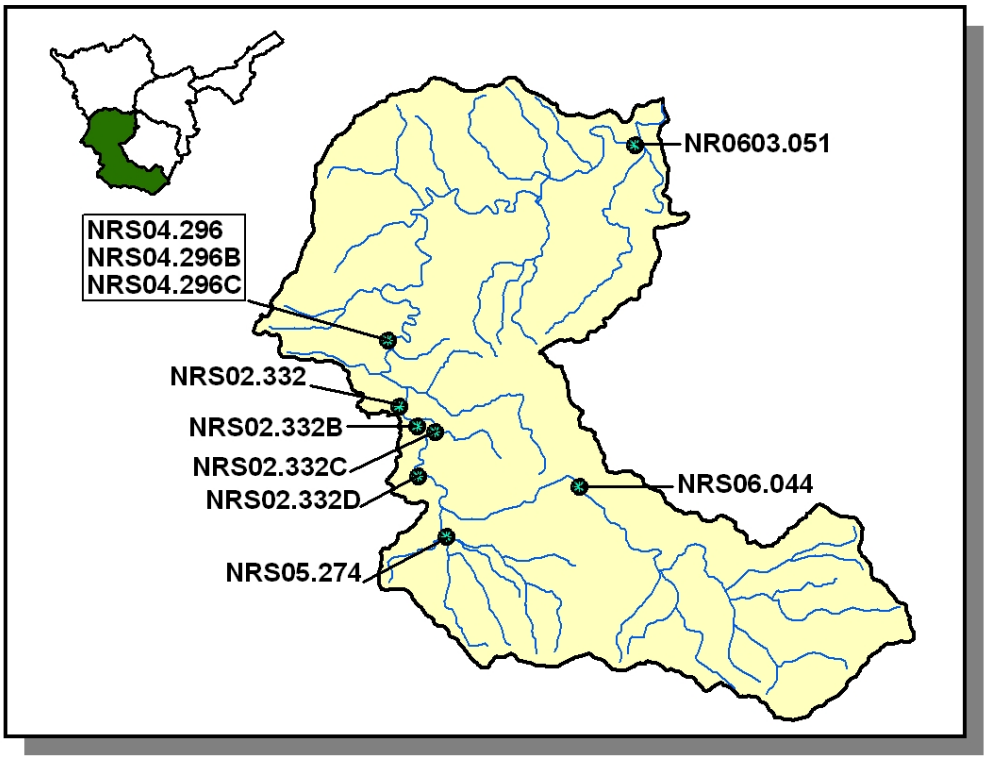

Figure 4-43. Location of ARAP (Aquatic Resource Alteration Permit) Sites in Subwatershed 060101050802. *More information is provided in Appendix IV.*

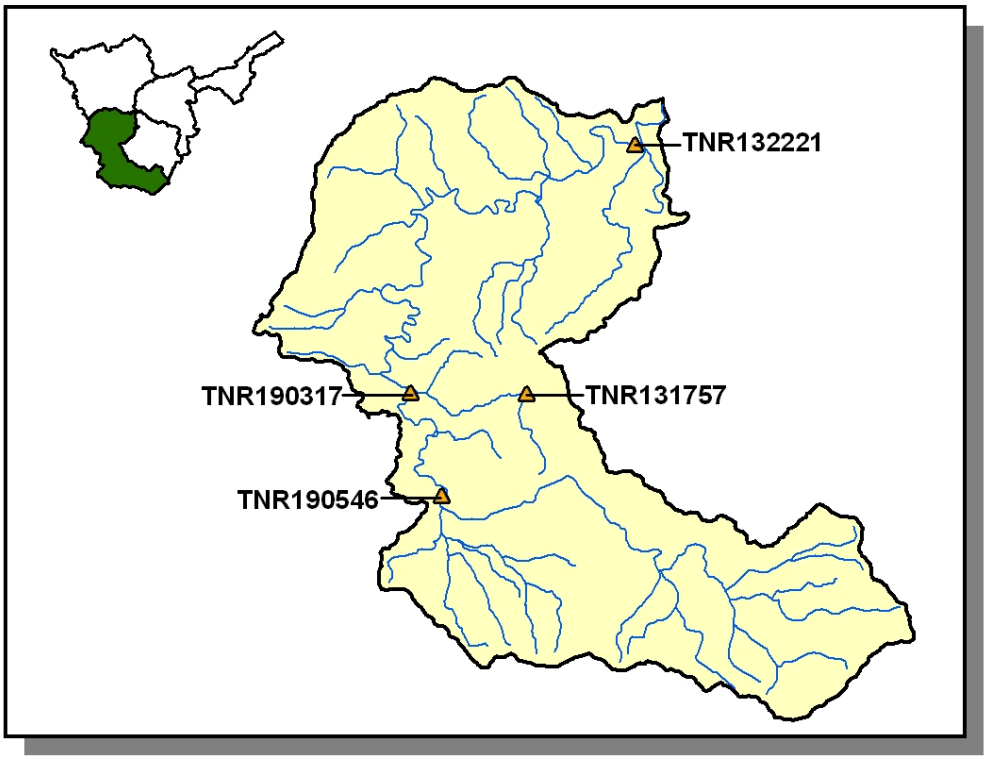

Figure 4-44. Location of CGP (Construction General Permit) Sites in Subwatershed 060101050802. *More information is provided in Appendix IV.*

4.2.E.iv. Nonpoint Source Contributions.

LIVESTOCK COUNTS						
County	Beef Cow	Cattle	Milk Cow	Chickens (Layers)	Hogs	Sheep
Cocke	8,169	16,971	1,224	361	269	90

Table 4-25. Summary of Livestock Count Estimates by County. *According to the 1997 Census of Agriculture (http://www.agcensus.usda.gov/), "Cattle" includes heifers, heifer calves, steers, bulls and bull calves; "Chickens" are layers 20 weeks and older.*

	INVENTORY		REMOVAL RATE	
County	Forest Land (thousand acres)	Timber Land (thousand acres)	Growing Stock (million cubic feet)	Sawtimber (million board feet)
Cocke	182.0	163.4	3.7	17.4

Table 4-26. Forest Acreage and Annual Removal Rates (1987-1994) by County.

CROPS	TONS/ACRE/YEAR
Tobacco (Row Crops)	15.78
Corn (Row Crops)	6.60
Wheat (Close Grown Cropland)	5.30
Grass Forbs Legumes Mixed (Pastureland)	0.85
Farmsteads and Ranch Headquarters	0.51
Grass (Hayland)	0.48
Grass (Pastureland)	0.36
Legume Grass (Hayland)	0.08

Table 4-27. Annual Estimated Total Soil Loss in Subwatershed 060101050802.